JUL 21 1930

Rock Products

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Chicago, July 19, 1930 | Issued Every Other Week | Volume XXXIII, No. 15

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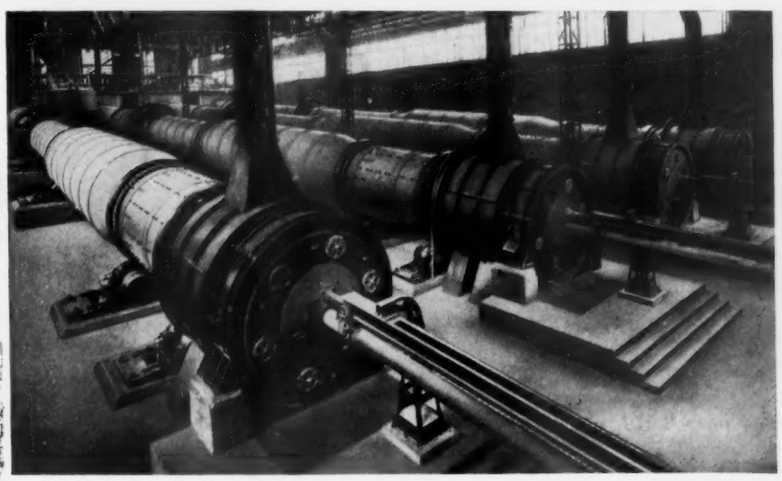

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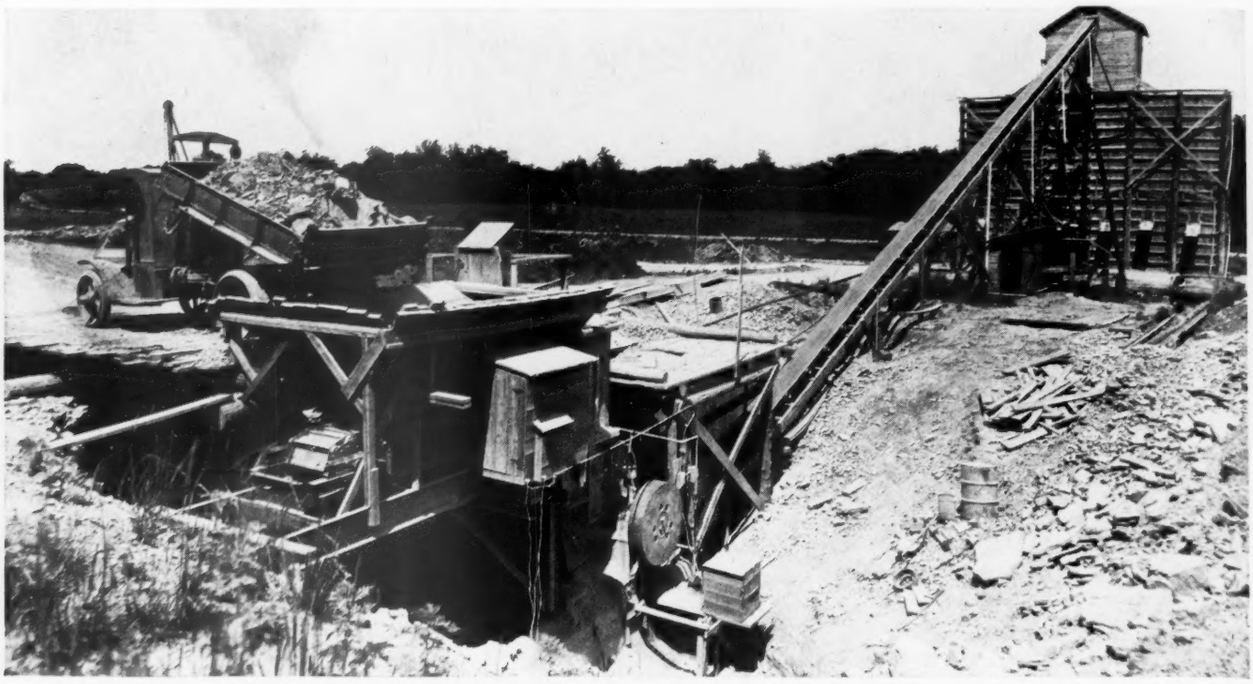

Crushing plant of Blue Rock Inc., Washington C. H., Ohio. Note large stone on truck which is broken to 2-inch with the Williams Hammer Crusher

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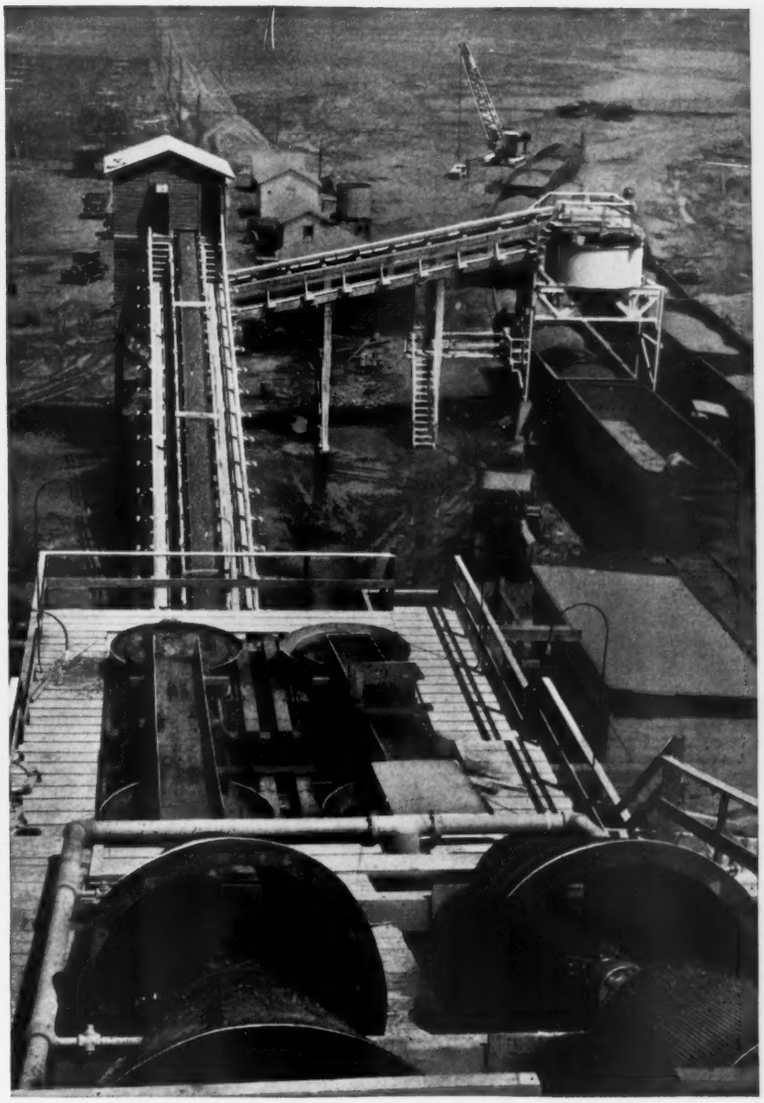

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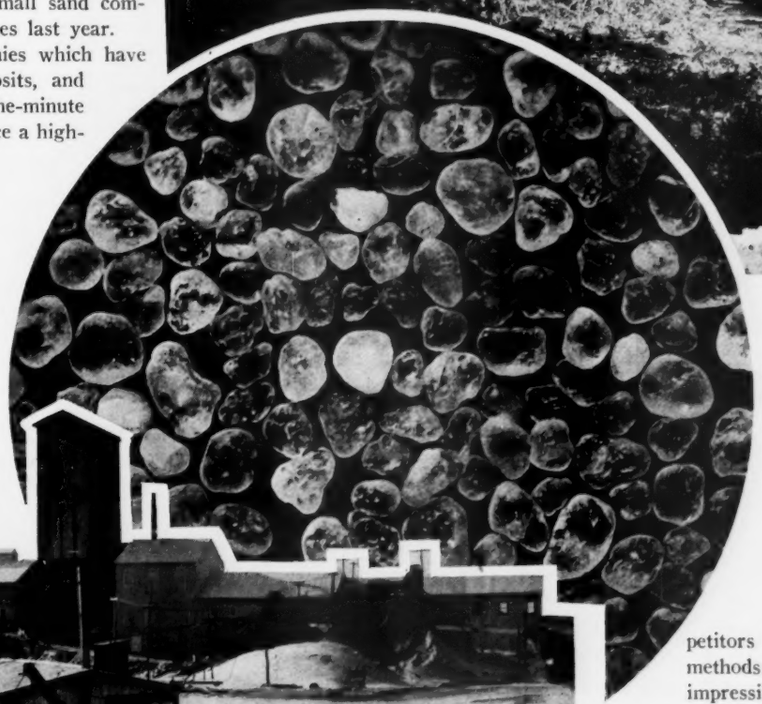
From Ancient Indian Hunting Ground to Pulverized Silica

New Jersey Silica Sand Co. Increases Plant Efficiency to Offset Pressure of Competition

SAND IN NEW JERSEY is such a widespread commodity that it is a simple matter to get into the silica sand or commercial business, although it may be another story when it comes to staying in, for competition is very keen, prices low and only those who are experienced and well financed can expect to stay in the game. It was reported that one particular small sand company changed hands five times last year.

Hence, only those companies which have exceptionally favorable deposits, and are equipped with up-to-the-minute plants, and are able to produce a high-grade product at a minimum cost, can expect to survive. These preliminary statements apply to the state as a whole, and should be doubly emphasized when considering the silica sand areas around Millville in South Jersey.

Former hunting grounds of the Munnuskin Indian tribe now are nothing more than overburden for immense sand banks



Round, spherical and pearl-like structure of New Jersey silica sand

One of the suction dredges. In the background is the pulverizing plant and dryer for producing blasting sand and silica flour

Some of the companies have adopted a policy of secrecy, attempting to withhold from their competitors what their usual operating methods are, but one gets the general impression that each has a fair, if not an excellent, idea of what his competitor's scheme of things is, and instead of all profiting from their combined experiences, each seems to prefer to pay individually the bill that should be divided among all the producers.

Competition in the silica sand industry is perhaps as keen as in any rock products industry. The successful marketing of silica

At left is one of the dredge ponds. Right, one of the dredges

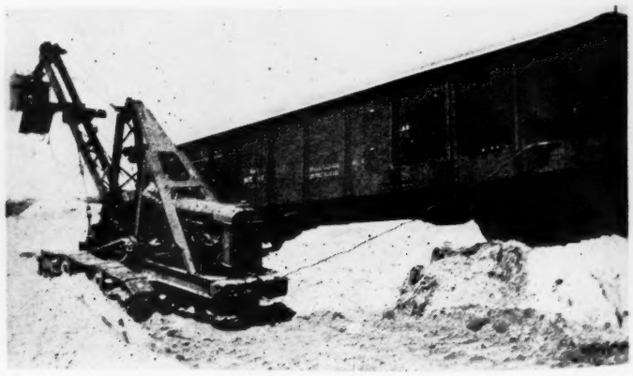
sand hinges on a thorough knowledge of the product and its uses, aggressive salesmanship, consistent advertising, backed by a meritorious product. The producer must also be a manufacturer, in a sense, for the demands of the trade, due to competition, are such that not only must the producer be able to ship bulk car or train-load lots of washed sand, but must also be able to supply a multitude of special products in small lots. The latter demand calls for expensive drying and pulverizing plants, complicated air separation devices, sacking machines, etc., with all the plant output subjected to rigorous laboratory control and inspection. Not only must he have these plants, but he must keep them abreast of the times, adding new pieces of machinery as they developed, changing the flow sheet of the plant when necessary so as to ever be a few jumps ahead of his customers' demands in this phase of the industry.

An illustration of this type of progressive producer can be found in the New Jersey Silica Sand Co. and its affiliated company, the National Pulverizing Co. The former company has been a producer and shipper of silica sand since 1921, and in 1926 the National Pulverizing Co. was formed by the owners of the sand company. The new corporation built a drying and pulverizing plant in that year on the property of the earlier company, a few miles south of Millville and on a site that adjoins the right-of-way of the Pennsylvania railroad. The formation and operation of the two companies is an interesting example of one method of meeting the problems of separate and distinct demands for experts in two distinct lines of the silica industry.

Loading cars with silica sand from one of the bank deposits

The offices of the two companies are in the same building at the plant, but each operation is conducted as an independent enterprise and each has its own executive and operating staff. The New Jersey Silica Sand Co.'s officers are: Burdette Tomlin, president; Clarence R. Wolf, secretary and treasurer; Jack Hallard, sales manager, and Howard J. Williams, plant superintendent. Walter Thompson has charge of the physical and chemical testing laboratory, and supervises the work of this nature for both companies. The National Pulverizing Co. has Wilbert Bivins as president; A. S. Carman, secretary and treasurer.

The New Jersey Silica Sand Co. owns 1200 acres of silica-bearing property adjoining the plant. Incidentally, as one view shows, this was once a hunting ground for Indians—the silica does support vegetation. By operating washing plants at chosen sites the company can produce almost any grade, from a physical standpoint, or any quality, from a chemical standpoint, that the trade demands. Its products include blended sands, core and steel molding sand, sand-blast sand and silica flour; and, as its slogan indicates, can ship "one car or 50." The chemical composition of the sands can range from 99.0% (plus) silica (SiO_2) to a sand having as high as 16.0% clay (Al_2O_3), with the balance silica. There is a very small amount of small diameter gravel associated with the sands. The gravel is separated, washed and sold locally for concrete aggregate. The



The company has 3,500 ft. of standard gage track serving its holdings. The shovels used for stripping and loading also are used for switching cars

gravel at this plant, however, is of minor importance.

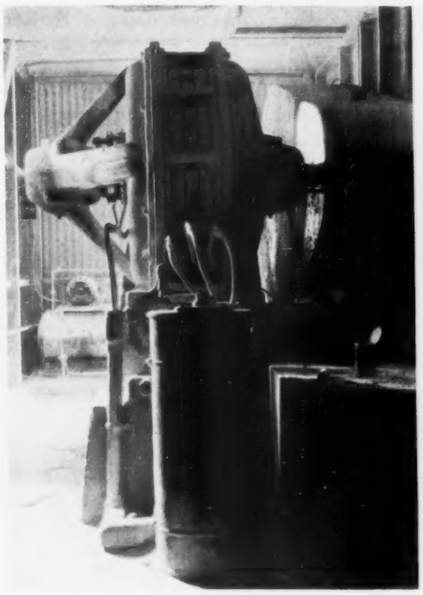
The New Jersey Silica Sand Co. has made extensive surveys of its deposits to show the character of the material from both a physical and a chemical standpoint. The degree to which these examinations have been extended is shown when one realizes that the company has made microscopic examinations of its silica products as well as of other silica products from South Jersey. These examinations have clearly brought out the fact that silica sand is not just sand but can be a material with special definite physical and chemical properties.

Microphotograph (A) shows silica sands from this company's deposit to be well rounded, clear, transparent and free from fissured particles. Sample (B) from another South Jersey deposit shows particles that are fractured, stained with iron oxide, include considerable "milky" grains and many particles that are porous.

This suggests that the latter sand would require more oil than the former for a binder should the sand be used for core material and is cited as an illustration of what can be done towards gaining information about one's material that will aid in its sale or extend its use.

The New Jersey Silica Sand Co. has three washing plants at different locations on the deposit. These plants can be supplied with raw sand by dredges, as the company owns three suction dredges, or they can be supplied by industrial haulage systems that include three Brooksfield gas locomotives, a fleet of Easton dump cars, four miles of 36-in. industrial trackage and 3500 ft. of standard-gage railroad. For loading from the dry pits, three Universal shovels using ½-yd. dippers are available, that are also used at times to remove the 2 to 3 ft. of overburden from the deposit. The dredges are equipped with both Morris and Georgia Iron Works centrifugal pumps.

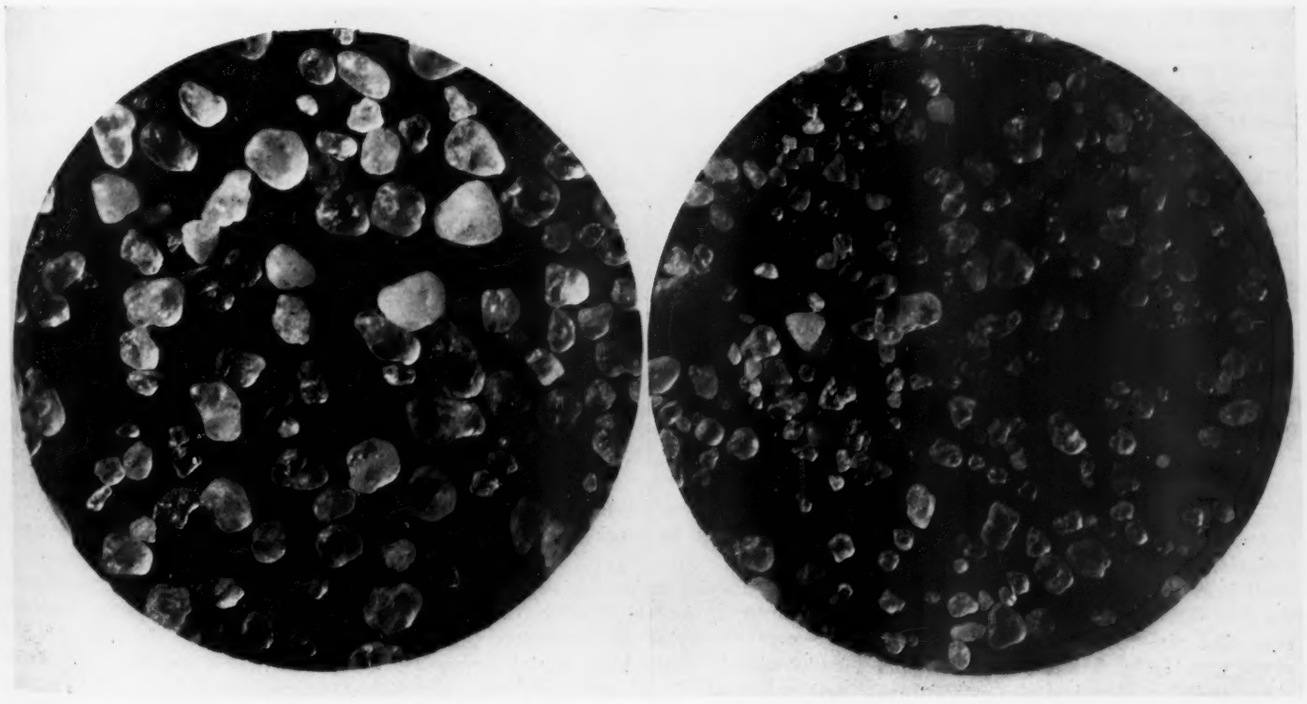
The Japanese sand drags operate the same as the usual type and are shown discharging to ground storage and to cars direct at the plant



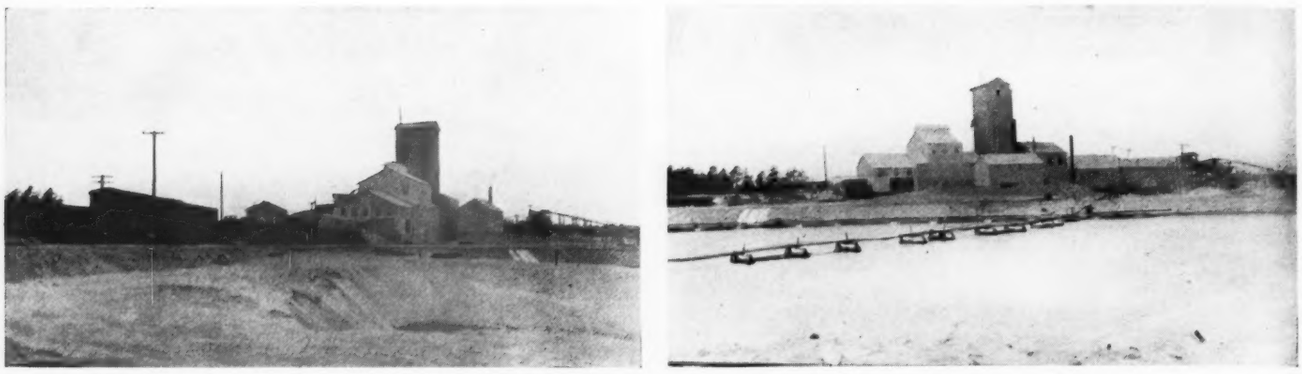
This 150-hp. motor drives one of the tube mills

The deposit, after the removal of the small oak trees, underbrush, etc., and the soil overburden, ranges in depth of from 25 to 35 ft. All of this depth is a remarkably clean, high-grade silica sand, with each particle, when viewed under a microscope, showing an even and well-rounded sand.

The sand-washing plants consist, usually, of a small scalper screen having a $\frac{3}{16}$-in. mesh wire cloth that acts to remove the small amount of gravel, roots and other debris. The sand then falls to sand drags (locally referred to as "Japanese" sand drags), which in essence are modeled somewhat after the conventional sand drags. There may be one or more of these operating in series, the discharge product from one falling to the feed end of the next; or they may be operated so that only the overflow



Microphotograph A, at left, shows sands from New Jersey Silica Sand Co. deposit as contrasted by microphotograph B, at right, of other South Jersey deposits



Two views of the National Pulverizing Plant, the one at the left showing car loading facilities. At the extreme right can be seen one of the sample washing plants

from one unit will pass to the next. The details of this method will depend entirely upon the size and grade of silica sand wanted. The units are small and usually made by the operators themselves, so that quick changes in washing practice can be made to accommodate the markets. The washed sand is then either loaded direct to cars for shipment or is sent to the pulverizing plant of the National Pulverizing Co., where the material is dried for sand-blast sand, or as a preliminary treatment before pulverizing.

The wet material is received into the "wet house," where it drains off most of the water. This sand is then passed to a belt conveyor feeding the dryer by a small Sauerman drag scraper.

The dryer consists of a hopper over a series of steam coils, so designed that when the sand is sufficiently free from moisture it cascades over the horizontal pipes, and can be discharged to a horizontal belt conveyor running under the dryer. The conveyor then can deliver the sand to bins for loading or to an elevator serving a series of Link-Belt screens, where classifications are carried out to give the required finenesses for the dry sand products produced.

The screened products can be shipped without further treatment or can be chuted to the feed end of two 7-ft. by 20-ft. Lewistown Foundry and Machine Co. tube mills. The tube mills are lined with silex liners and use imported silica pebbles as the grinding media, so as to preclude any possibility of introducing iron into the silica flour. The mills are each driven by a 150-hp. General Electric induction motor through enclosed chain drives.

This spring considerable alterations were made in the method of operating the tube mills, as it was essential to reduce grinding costs. The cost of relining a tube mill and equipping it with grinding pebbles is no small item, so anything that would increase the lives of the lining and pebbles and at the same time give the usual mill tonnages or more, was highly desirable. A finer and closer graded product was also essential, as have been made at times for a minus 300-mesh silica flour for special fillers.

These desirable added features were secured by installing a 14-ft. Sturtevant air separator above the two mills and elevating the tube mills' discharge product to the separators. The mills were then operated in closed circuit with an increased sand load in each of the mills. It was found that the capacity of the mills was practically doubled, and owing to the greater load in the mills, the life of the liners increased greatly. The mills now have a total capacity of 10 tons per hour when grinding 90% minus 200-mesh.

The Sturtevant separator also delivers a more uniform product and permits of quick changes in fineness of the recovered material; also, it is not necessary to "wash" out the tube mills when making such changes. The collector requires a 35-hp. motor to operate.

The silica flour can be shipped in paper-lined box cars or in 100-lb. multi-walled paper bags, using Bates sacking equipment for the latter purpose.

Rationalization of a British Cement Company

AT THE ANNUAL MEETING of the Associated Portland Cement Manufacturers, Ltd., held in London on March 31, the chairman, P. Malcolm Stewart, was able to review the results of the five years program of rationalization undertaken by the company in 1924. At the time when this program was initiated the company was suffering from two major disabilities, overcapitalization and small obsolete plants. The directors had either to reduce the value of the capital to make it correspond with the market value of the assets or to raise the value of the assets to correspond with the capital. They selected the latter method. The results may be considered from three standpoints.

1. On the side of production new plant was substituted for old at a total expenditure over the period of £1,600,000. One works with 12 rotary kilns, having an annual output of 250,000 tons, was replaced by an entirely modernized factory with four kilns having an annual output of 500,000 tons. At another works 16 rotary kilns were replaced by three kilns with an output of 400,000 tons. Grinding and packing plants were modernized and concentrated. Electrically operated excavators and washing plants were installed to handle the raw material. Multiple steam and other power units were scrapped in favor of electrical installation at various works. The total annual output of the company is today 1,500,000 tons or 25,000 tons more than were contemplated in the original program of reconstruction.

2. At the same time the sales side of the company was completely reorganized. Progressive marketing methods were adopted directed to the establishment of branded products and the maintenance of a high standard of quality. Particular attention was directed to the education of consumers both at home and overseas in the manifold uses of cement. New products were developed, such as "Ferrocrete," a quick-hardening cement. Despite intensive competition overseas the export trade of the company was increased by 45% over the level of 1924. In the home market overproduction during the period resulted in a decrease of 25% in selling prices. But the tonnage disposed of by the company has continued to increase.

3. The financial results have been equally satisfactory. The total share capital has been increased by £777,785; but mortgages, debentures and other prior charges have been liquidated amounting to within a few hundred pounds of this figure. Despite the heavy investment in new equipment, surplus assets stand at £1,100,000 as compared with £440,000 at the beginning of the period. The investment account is particularly strong, the book value of the company's holding in British Portland Cement Manufacturers, Ltd., being £1,500,000 less than the current market value of the shares. Net profit for 1929 was three times as great as in 1924, despite £50,000 depreciation.

The chairman was also able to announce that the company had been able to provide improved conditions for its employes and that "increased trade has absorbed to a considerable degree the reduction in the number of employes due to rationalization."—*The Times*, London, April 1, 1930.

Study of Quarry Costs*

Trap Rock—Sandstone—Granite—Crushed Stone

By J. R. Thoenen
Mining Engineer, U. S. Bureau of Mines

DURING 1928 questionnaires covering the calendar year 1927 were sent to over 1700 quarries producing stone for purposes other than cutting to dimension. These included producers of stone for lime burning, cement manufacture, rip rap and crushed stone. The various kinds of stone represented were limestone, trap rock, sandstone, granite and marble.

Replies received from limestone producers prior to November, 1928, were compiled into tables and published in February, 1929, as a preliminary report (Bureau of Mines Report of Investigation 2911, published in ROCK PRODUCTS, March 16, 1929).

The present paper summarizes the final tabulations of costs of (1) trap rock, (2) standstone, and (3) granite quarries. It is regretted that the figures presented do not cover a larger number of quarries, because the greater the number of similar plants presenting data to be averaged, the greater the value of the averages. If more producers had co-operated the figures would more nearly represent averages and costs for the country as a whole, but since the detailed costs of even a single quarry are of value to other operators as a means of checking efficiency at each step, the writer believes the data are well worth publishing and wishes to take this opportunity of extending his thanks to the companies who contributed the information that makes possible even this incomplete cost study.

Trap-Rock Quarries

Trap rock as covered in this circular is defined as that rock commonly called "trap" by stone producers. The author realizes that there are various kinds of rock designated as "trap" by the trade which do not conform to the same mineralogic definitions. Although separation according to these differences in physical characteristics might increase or lower production costs, there is not sufficient information at hand to differentiate, and they are combined in order to present a maximum of cost detail.

Complete or part replies were received from 27 trap-rock quarries representing plants in 13 states, scattered from California to Connecticut and from Minnesota to Georgia.

Of these 27 reports, 21 were sufficiently complete to compile into tabular form, and parts of the others have been used in those parts of the report wherein their information was pertinent. Some of the detailed costs which are totally out of line with the averages have not been used to make up the final tabulations.

Recognizing that the size of the quarry operation has an important bearing on the ultimate cost of operation, the quarries have been grouped in various combinations as shown in the tables.

The purpose for which the stone is prepared may also affect final costs, but in the case of trap rock all but one reported their major product as crushed stone, hence there is no differentiation in the tables by uses. The one exception was a quarry which had no crushing equipment because it produced stone exclusively for rip rap.

In those tables dealing with the details of operating steps as much information is presented as is possible without divulging the costs of any individual operator. Some costs of an individual operation, needed for comparative purposes, are given in percentages of the operating and total costs.

There are so many and such varied angles from which to approach the subject of crushed stone costs that a word of caution is advisable prior to the study of the tables.

1. The following costs are based upon the tonnage of material sold. In many plants an appreciable tonnage of material produced is not marketable and is wasted. The cost of production in this case if calculated against the total production would be correspondingly lower than where only the product sold was considered. Nevertheless, such a cost would be truly a production cost.

2. The tables represent costs for the total tonnage sold, irrespective of the market value of the separate grades. Crushed stone is sold under innumerable size specifications and combination of sizes. In certain parts of the country the smaller sizes down to one-fourth inch command a price premium. In other sections the larger sizes are the higher priced. Obviously the more time and energy spent upon a product the greater will be its cost of production. The smaller sizes of stone are more expensive to produce because of greater crushing, screening, and handling charges. On the other hand, in the majority of localities there are more of the smaller sizes made by producers than the market will absorb. This makes them a waste product which the operator is often anxious to move even at a price below his actual cost. Even where all sizes of stone are sold at the same price the smaller sizes may be selling below cost, although the larger sizes bring a profit.

It must therefore be borne in mind that the cost figures which follow are based on total sales tonnage irrespective of size or other special preparations. Table 1 shows costs of 23 quarries in percentages.

The wage cost as shown therein is compiled from the total number of employes, the average rate of pay, and the total annual production.

The quarry cost represents all operating costs, including stripping, drilling, blasting, loading, and transportation from the quarry to the crushers and in some instances some minor miscellaneous costs chargeable to the quarry operation.

Crushing and screening costs include all operating costs connected with crushing, screening, elevating, storage, and truck or car loading.

The quarrying, crushing and screening

TABLE 1. TRAP-ROCK QUARRY PERCENTAGE COSTS

Tons produced daily	0-199		200-499		500-999		1,000 and up	
	Per cent of							
Method of loading and cost details	Operating cost	Total cost	Operating cost	Total cost	Operating cost	Total cost	Operating cost	Total cost
Hand-loading:								
Number of quarries	3		3		1		1	
Wage cost	59	43	47	38	56	43	57	39
Quarry cost	74	54	63	50	85	65	90	60
Crushing and screening cost	26	20	37	30	15	11	10	7
Total operating cost	100	74	100	80	100	76	100	67
Overhead cost	.....	26	.....	20	.....	24	.....	33
Total cost	.....	100	.....	100	.....	100	.....	100
Shovel-loading:								
Number of quarries	--		3		6		6	
Wage cost	.....	.....	50	25	47	34	42	25
Quarry cost	.....	.....	67	33	59	35	68	41
Crushing and screening cost	.....	.....	33	16	41	25	32	19
Total operating cost	.....	.....	100	49	100	60	100	60
Overhead cost	.....	.....	.....	51	.....	40	.....	40
Total cost	.....	.....	.....	100	.....	100	.....	100

*Reprinted from U. S. Bureau of Mines Information Circular 6291.

costs added together represent the total operating cost as shown.

The overhead costs comprise such items as depletion, royalty, depreciation, interest on capital investment, taxes, and various others such as insurance, sales expense, etc., listed as miscellaneous overhead.

Inasmuch as quarry operations may be divided into the two general methods of hand and power-shovel loading, this differentiation is also made in the table.

Percentages are shown of both operating and total costs.

Table 2 presents the actual costs of 21 quarries grouped on the same basis of production size and method of loading as in Table 1. The costs represent the same items as defined in Table 1, and the two individual quarries shown in Table 1 are necessarily omitted to avoid exposing their costs.

It is interesting to note that the total cost in the three hand-operated quarries of the second group size is lower than that for the shovel-operated quarries of the same group. This is due directly to the difference in overhead costs. A production of less than 500 tons daily is probably small for shovel operation, which possibly accounts for the higher overhead charges.

Singularly enough, the one hand-operated quarry shown in the third group in Table 1 has a total cost per ton less than the average for the six shovel-operated quarries in that group due to lower overhead and crushing costs. Also only one of the six shovel-operated quarries shows a lower total cost than this one hand operation.

TABLE 2. TRAP-ROCK QUARRY COSTS

Loading method and daily production	Number of quarries	Avge. wage per man-hour	Average total labor cost per ton	Average quarry cost per ton	Avge. crushing and screening cost per ton	Avge. total operating cost per ton	Average total overhead cost per ton	Average total cost per ton
0-199 tons:								
Hand-loading	3	$0.41	$0.59	$0.74	$0.26	$1.00	$0.36	$1.36
200-499 tons:								
Hand-loading	3	.57	.46	.61	.36	.97	.24	1.21
Shovel-loading	3	.60	.44	.58	.30	.88	.90	1.78
500-999 tons:								
Shovel-loading	6	.53	.33	.41	.29	.70	.47	1.17
1,000 tons and over:								
Shovel-loading	6	.57	.21	.34	.16	.50	.33	.83

TABLE 3. TRAP-ROCK QUARRY OPERATING COST DETAILS

Loading method and daily production	Average stripping cost: Per cu. yd. overburden	Average stripping cost: Per ton stone	Average drilling cost per ton stone	Average blasting cost per ton stone	Average loading cost per ton stone	Average tranportation cost per ton stone	Average storage cost per ton stone	Average crushing cost per ton stone	Average other operating cost per ton stone	Average total operating cost per ton stone from Table 2
0-100 tons:										
No. quarries reporting	2	2	2	1	2	1	..	2	..	3
Hand-loading	$0.48	$0.07	$0.12	$0.10	$0.12	$0.07	.....	$0.30	.....	$1.00
200-499 tons:										
No. quarries reporting	1	1	2	3	2	2	1	2	3	3
Hand-loading	.38	.02	.15	.09	.17	.07	.16	.44	.03	.97
No. quarries reporting	1	2	3	3	3	2	2	3	..	3
Shovel-loading	1.00	.11	.16	.10	.10	.07	.13	.27	.....	.88
500-999 tons:										
No. quarries reporting	4	3	6	5	6	6	4	5	1	6
Shovel-loading	1.22	.09	.11	.12	.11	.07	.04	.15	.07	.70
1,000 tons and over:										
No. quarries reporting	5	3	4	4	4		2	5	3	6
Shovel-loading	1.19	.03	.08	.05	.18		.06	.11	.05	.50

Cost Details

Although all of the quarries shown in Table 2 returned costs in the detail shown, not all of them returned costs for each of the contributing operating steps. Therefore Table 3 will not present figures that can be totaled to equal the corresponding columns on Table 2. In each case the number of quarries reporting is given, from which the average figures shown in the table are computed.

OPERATING COSTS — In presenting detailed operating costs the figures are used as returned by the operators. The questionnaire stated clearly that no overhead costs were to be included.

OVERHEAD COSTS—Because of the different methods used by various individuals in calculating overhead costs, there will be a considerable range in overhead costs, as is shown by the tabulation.

TABLE 4. TRAP-ROCK QUARRY OVERHEAD COST DETAILS

Loading method and daily production	Average depletion or royalty cost per ton stone	Avge. depreciation cost per ton stone	Average interest charge per ton stone	Average tax charge per ton stone	Avge. miscellaneous overhead charge per ton stone	Average total overhead charge per ton stone from Table 2
0-199 tons:						
No. quarries reporting	3	1	..	..	1	3
Hand-loading	$0.11	$0.20	.....	.....	$0.37	$0.36
200-499 tons:						
No. quarries reporting	1	3	1	2	2	3
Hand-loading	.01	.07	$0.05	$0.02	.11	.24
No quarries reporting	1	1	1	1	3	3
Shovel-loading	.18	.32	.06	.01	.72	.90
500-999 tons:						
No. quarries reporting	4	6	4	5	6	6
Shovel-loading	.05	.15	.06	.03	.20	.47
1,000 tons and over:						
No. quarries reporting	2	5	5	5	4	6
Shovel-loading	.02	.10	.10	.02	.14	.33

TABLE 5. TRAP-ROCK QUARRY PRODUCTION

Daily production	Loading method, H = hand S = shovel	Average wage per man-hour	Days worked yearly	Average height of quarry face, ft.	Average production in tons per man-hour: In quarry	In crushing plant	In other labor	In total plant	Average operating cost Table 2	Average total cost Table 2
0-199 tons:										
No. quarries reporting		3	3	3	3	2	1	2	3	3
	H	$0.41	154	73	1.0	4.7	1.6	0.8	$1.00	$1.36
200-499 tons:										
No. quarries reporting		3	3	3	2	2	2	3	3	3
	H	.57	217	76	2.4	18.0	3.0	1.9	.97	1.21
No. quarries reporting		3	3	2	3	2	2	3	3	3
	S	.60	244	83	2.1	6.0	6.8	1.6	.88	1.78
500-999 tons:										
No. quarries reporting		6	6	6	6	6	5	6	6	6
	S	.53	227	118	3.5	8.3	7.5	1.7	.70	1.17
No. quarries reporting		6	6	5	5	5	5	6	6	6
1,000 tons and over:										
	S	.57	203	160	11.7	11.1	5.6	2.8	.50	.83

Production in Units of Labor

The quarry operator often desires to know what tonnage can be produced per unit of labor. Table 5 has been compiled with this end in view. It is not possible to obtain a direct comparison per man employed, because at some plants the day is 8 hours whereas at others it is 9 and sometimes 10 hours. Therefore the unit taken is the man-hour. This unit has been obtained by multiplying the average number of men employed by the hours per day and the days operated annually, and dividing this product into the annual production.

In order to present other comparable data, columns have been added which may influence the result. The same unit size groups are retained as in the preceding tables.

Stripping

The details of costs on overburden removal were not sufficiently complete to draw definite conclusions. One reason for this is that many producers reported no stripping, but that they separated the stone and dirt on the quarry floor. The results as compiled from the returns are presented in Table 6.

TABLE 6. TRAP-ROCK QUARRY STRIPPING COSTS

Method of overburden removal	Average daily stone production, tons	Average thickness of overburden, ft.	Average height of quarry face, ft.	Average length of waste haul, ft.	Average cost overburden removal per ton stone	Average cost overburden removal per cu. yd. per 100-ft. haul	Average operating cost per ton stone	Per cent of operating cost for stripping	Average total cost per ton stone	Per cent of total cost for stripping
Hand and wagon	385	3.6	63	525	$0.045	$0.125	$0.88	5.1	$1.22	3.7
Hand and truck	800	12.0	185	500	.02	.16	.80	2.5	1.05	1.9
Drag scraper	455	13.0	65	156	.01	.66	.90	1.1	1.53	0.6
Power shovel and truck	1,180	8.6	118	550	.05	.28	.71	7.0	1.04	4.8
Power shovel and car	1,410	5.0	175	850	.03	.075	.52	5.8	.91	3.3

Drilling

Drilling costs at practically all trap-rock quarries may be subdivided into two general classes: Primary—covering that operation designed to break the rock from the solid; and secondary—covering the breaking of boulders to handling-size after the initial quarry shot.

Churn, piston, and hammer drills are used in primary drilling, but the hammer drill is practically the only tool used in secondary drilling. The number of quarries using piston drills was not sufficient to tabulate without exposing individual figures.

High benches are broken with churn drills, whereas the piston and hammer drills cut lower benches, but these often are arranged in such manner as to bring down a high face in a succession of steps. Obviously the single and multiple bench method of drilling will present different operating problems, and drilling costs have been segregated on that basis.

Some questionnaire replies gave the cost of drilling per ton of stone broken, but did not state the cost of drilling per foot of hole. In such cases the tonnage broken per foot of hole has been calculated from the data given as to depth and spacing of holes, using 175 lb. as the weight per cubic foot of trap rock. In other cases the cost per foot was given, but no cost per ton, and a similar calculation has been made.

Realizing the effect that size of quarry operation and height of face have on drilling costs, the average daily production and height of face are shown for each group. Also the average length of the holes is given a separate column in the table, for in many instances holes are drilled below the quarry floor to insure bringing out the toe.

In order to determine the relation between the diameter of the hole drilled and the cost of drilling, calculations have been made showing tonnage broken per cubic foot of hole drilled. This calculation is made by dividing the tons broken per foot of hole by the volume of the hole per foot of length. It is interesting to note that although hammer-drill holes cost twice as much as churn-drill holes per cubic foot of volume, the hammer-drill hole seems to have a slight advantage in tonnage broken per unit of volume.

In the second section of the table a comparison is made between churn-drill holes of 6-in. and 8-in. diameters. Although the cost of drilling 8-in. holes is shown to average $5.17 per ft. as against $1.70 for 6-in. holes, the primary drilling cost per ton is the same and total drilling cost is less for 8-in. holes. This would seem to indicate better fragmentation with the larger hole. The apparent difference between length of hole and height of quarry face shown in those quarries using 8-in. holes is explained by one quarry in this group cutting the stone in two benches. All others drilled holes from 5 to 10 ft. below the quarry floor.

It is also of interest that where 1 cu. ft. of hole 8 in. in diameter accounted for 229 tons, the same volume of 6-in. hole produced only 158 tons.

In considering drilling costs the depth of the holes must not be lost sight of, for the last few feet of the bottoms of the holes are the most expensive, and where the 8-in. holes averaged 146 ft. in depth, the 6-in. holes averaged 112 ft.

Unfortunately only a few quarries using hammer drills reported their primary drilling costs, and only one reported the secondary cost. Several reported the total cost which is averaged as shown.

There was not sufficient data contained in the replies to make comparisons of drilling cost based on the type of power used by the drill.

Blasting

The returns show that trap-rock quarries in all but a few instances employ mixtures of explosives of different strength. In some instances 40% strength and in others 60% are used alone, but in most cases these two are mixed in the charge; in others dynamite of 75% strength is added. Three quarries reported coyote or tunnel blasting, but the details given were insufficient to include in the table.

The results are averaged as shown in Table 8.

Loading

Unfortunately there were not sufficient details in the returns to differentiate and make comparisons of the duty performed by shovels of different type and power. Many operators reported the type of shovel used as railway, traction or caterpillar, but neglected to state the kind of power used and vice versa. Others listed the size of the dipper but did not state the number of shovels employed. Also, although many reported their loading cost, some combined it with the cost of transportation so that it is impossible to segregate them. As a result

TABLE 8. TRAP-ROCK QUARRY BLASTING COST

	Average daily stone production, tons	Average height of quarry face, ft.	Average depth of drill holes, ft.	Average diameter of drill holes, in.	Tons broken per lb. explosive: Primary	Secondary	Total	Average blasting cost per ton stone: Primary	Secondary	Total	Average operating cost per ton stone	Per cent of operating cost for blasting	Average total cost per ton stone	Per cent of total cost for blasting
Churn drills	1,046	131	120	6.7	†	†	4.5	$0.06	$0.04	$0.10	$0.68	15	$1.14	9
Hammer drills	282	66	18	2.0	..	..	2.5*	....	....	.11*	.98	11	1.45	8
Churn drills	1,075	113	112	6.0	†	†	†	.04	.03	.07	.64	11	1.08	6
Churn drills	1,160	168	146	8.0	†	†	†	.03	.05	.08	.68	12	1.11	7

*Average of two quarries only.
†Insufficient data to complete these columns.

TABLE 7. TRAP-ROCK QUARRY DRILLING COST

Method of drilling	Average daily stone production, tons	Average height of quarry face, ft.	Average depth of holes primary drilling, ft.	Average diameter of holes primary drilling, in.	Tons of stone produced per drill per day: Primary	Secondary	Tons broken per ft. of hole primary	Tons broken per cu. ft. of hole primary	Average cost per ft. of hole primary	Average drilling cost per cu. ft. of hole	Average drilling cost per ton of stone broken: Primary	Secondary	Total	Average operating cost per ton stone	Per cent of operating cost for drilling	Average total cost per ton stone	Per cent of total cost for drilling
Churn drills	1,046	131	120	6.7	416	222	50.0	206	$3.17	$13.05	$0.60	$0.80	$0.14	$0.68	21	$1.14	12
Hammer drills	282	66	18	2.0	129	160	4.9	224	.57	26.06	.07	....	.11	.98	11	1.45	7.6
Churn drills	1,075	113	112	6.0	541	251	31.0	158	1.70	8.65	.05	.09	.14	.64	22	1.08	13
	1,160	168	146	8.0	554	125	80.0	229	5.17	14.80	.05	.07	.12	.68	18	1.11	11

TABLE 9. TRAP-ROCK QUARRY LOADING COSTS

Details of operation	Average daily stone production, tons	Average height of quarry face, ft.	Average loading cost per ton stone	Average operating cost per ton stone	Per cent of operating cost for loading	Average total cost per ton stone	Per cent of total cost for loading
Hand-loading after hammer drills....	167	71	$0.125	$0.96	13	$1.26	10
Shovel-loading after churn drills.....	904	133	.11	.70	16	1.22	9
Shovel-loading with dippers of 2 cu. yd. capacity and under.....	794	117	.11	.74	15	1.23	9
Shovel loading with over 2 cu. yd. dipper capacity	1345	198	.085	.56	15	1.15	7.4

TABLE 10. TRAP-ROCK QUARRY TRANSPORTATION COSTS

Hauling method	Loading method H = hand S = shovel	Average daily stone production, tons	Range in weight of locomotive, tons	Range in car capacity, tons (1 cu. yd. = 1½ tons)	Average transportation cost per ton of stone	Average operating cost per ton of stone	Per cent of operating cost for transportation	Average total cost per ton of stone	Per cent of total cost for transportation
Wagons	H	100	.....	.....	$0.07	$0.91	7.7	$1.34	5.2
Auto truck	S	680	.....	2-3	.10	.75	13	1.45	7
Hoist and cable.....	S	800	.....	3	.05	.99	5	1.23	4
Gasoline locomotive....	S	1250	3-3½	1½-4	.075	.62	12	1.00	7.5
Steam locomotive.....	S	733	14-26	4-18	.03	.56	5.4	.94	3.2

TABLE 11. TRAP-ROCK QUARRY COMBINED LOADING AND TRANSPORTATION COSTS

Loading and transportation details	Average daily stone production, tons	Average height of quarry face, feet	Range in size of dipper capacity, cubic yards	Range in weight of locomotive, tons	Range in car capacity, tons (1 cu. yd. = 1½ tons)	Average loading and transportation cost per ton of stone	Average operating cost per ton of stone	Per cent of operating cost for loading and transportation	Average total cost per ton of stone	Pct. of total cost for loading and transportation
Hand-loading and hand transportation	683	70	.....	.....	1.5-3	$0.24	$0.94	25.5	$1.26	19
Hand-loading and wagon transportation	190	37	.....	.....	.....	.25	.89	28	1.19	21
Shovel-loading and auto truck haul	650	136	3-4	.....	2-3	.22	.75	29.3	1.45	15
Shovel-loading and railway haul 1166		130	¾-6	3-26	1.5-18	.16	.56	28.6	.98	16.3

the loading costs cannot be shown in as great detail as desired.

Table 3 shows average loading costs as applied to hand or shovel loading and tonnage produced daily.

The accompanying table (No. 9) shows such segregations as are possible from the returns.

Transportation

By transportation is meant the movement of stone from the quarry face to the crushing plant. Cost comparisons are tabulated on the basis of equipment used. This varies from the simple hoist with cable reaching to the quarry face to the more complicated haulage systems involving 30-ton locomotives and 12-yd. standard-gage cars.

Table 10 presents hauling costs in such detail as the replies permit. Owing to the manner in which several replies presented combined loading and transportation costs, Table 11 has been computed to present further comparison.

Crushing

The prevailing custom among trap-rock producers is to employ jaw crushers as initial breakers. Second-stage reduction is accomplished in most cases by gyratories, although some operators prefer the jaw type for all breaking. In some of the larger installations third or fourth stage reduction is obtained by gyratories, cone or disk crushers, and in one instance the use of rolls was reported.

In Table 3 the crushing costs are shown segregated into groups with relation to size of daily production. Of the first group producing less than 200 tons daily, 75% of those reporting showed no secondary crushing, the product from the initial breaker constituting the sales product. The majority of these plants used small jaw crushers. Those employing secondary breaking used gyratories for both initial and subsequent crushing.

In the second group producing from 200 to 500 tons daily, all but one plant used jaw crushers for first reduction, while secondary breaking was divided equally between jaw and gyratories. Half of these producers used crushers with less than 24-in. square openings and the rest used large equipment.

The third group with from 500 to 1000 tons daily production was 75% equipped with jaw crushers as initial breakers; all the crushers had 24-in. or larger square openings. For secondary breaking, 50% used jaw crushers exclusively or in combination with gyratories, 50% used gyratories and one operator employed a combination of gyratory, roll and disk crushers.

Going to the larger producers of over 1000 tons daily capacity, again 75% prefer jaw crushers for initial reduction, but in this group there were no jaw-type machines listed as secondary breakers. All used gyratories for this step, or gyratories in combination with other types in which the disk predominated, although the cone type had its adherents.

It is interesting to note that where jaw crushers of less than 24-in. square opening were used as initial breakers, the crushed product after breaking averaged 4½ in. in size as reduced from quarry-run material. With the larger size of jaw crushers the first reduction averaged 7.2 in. The small gyratories averaged 5-in. stone and the larger size 6-in. stone after initial break.

Carrying this further, the average size of material fed to secondary crushers of the jaw type was 6½ in., while the feed to a combination of jaw and other types was 3 in. The feed to secondary gyratories was 5.8 in., and to this type in combination with others was 8½ in. The average setting of secondary crushers was for 2-in. material.

The fact is interesting that crusher sizes range from an 8 by 10 in. to a 66 by 86 in. jaw crusher and from a 10-in. to a 30-in. gyratory. Some 70% of the plants use electric power for crusher drives.

Table 12 shows such additional details of crushing costs as is possible from the replies.

Conclusions

In several of the tables where cost items, as presented in the columns, would be expected to add horizontally to totals on the right and do not, the explanation is found in that for different columns various numbers of quarries are averaged. As an example, in Table 3 it will be found that the various items which go to make up the total operating cost in the last column will not add to that figure. This is because not all reports contained costs in the same detail. Therefore the details involve different plants within that particular group.

Where spaces are unfilled there has not been sufficient data present to tabulate without fear of exposure of individual figures, or the few results have been so divergent as to be of little value.

The figures presented in the preceding tables represent data from a total of 27 quarries with an annual capacity of over 4,300,-

TABLE 12. TRAP-ROCK QUARRY CRUSHING COSTS

Crushing method: Primary Type	Primary Size*	Secondary Type	Loading method H = hand S = shovel	Average daily stone production, tons	Range in size of dipper capacity, cubic yards	Range in car capacity, tons (1 cu. yd. = 1½ tons)	Crushing cost: Primary	Crushing cost: Secondary	Crushing cost: Total	Average operating cost per ton of stone	Per cent of operating cost for crushing	Average total cost per ton of stone	Per cent of total cost for crushing
Jaw	S	None	H	100	.....	.....	.....	.....	$0.35	$0.91	38	$1.34	26
Jaw	S	Gyratory	H&S	344	7-8	1.5-6	.....	.....	.44	1.09	40	1.59	28
Jaw	S	Jaw	S	820	3-4	2-3	$0.13	$0.04	.17	.67	25	1.28	13
Jaw	L	Gyratory	S	1262	1.25-6	3-10	.08	.05	.13	.59	22	.90	14
Gyratory	S	None	H	50	.....	1	.....	.....	.24	.87	28	1.13	21
Gyratory	S	Gyratory	H	700	.....	3	.....	.....	.15	.80	19	1.06	14

*S indicates primary crusher with receiving opening 24 in. square and less. L indicates primary crusher with receiving opening over 24 in. square.

000 tons, or roughly one-third of the trap rock produced in the United States in 1927 for other than dimension stone purposes.

Sandstone

Sandstone as covered in this report is defined as that stone designated "sandstone" by the operators reporting. Several operators engaged in the production of ganister for silica brick interpreted the questionnaire as not applying to them since they did not sell their product as crushed stone. Several replies were so obviously the result of a misunderstanding of the information desired that they could not be used in compiling averages. Several operators reported quarry costs without giving crushing and overhead costs. Detailed quarry step costs were so incomplete as to prevent any tabulation of the results.

Stripping

Only two quarries reported having any stripping cost. Of these, one stripped by hand with dump wagons and the other with a small shovel using auto trucks for transportation.

The first quarry, stripping by hand, hauled the dirt 200 ft. to the dump at a cost of $1.48 per cu. yd. of waste, or 5 c. per ton of stone. The cost per 100 ft. of haul was 74 c. per cu. yd.

The second quarry, handling its dirt by shovel and truck, hauled 500 ft. at a cost of 98 c. per cu. yd., or 2.4 c. per ton of stone, with a cost per 100 ft. of haul of 20 c. per cu. yd.

The overburden in both cases was clay.

Drilling

Three quarries reported drilling costs. Two using hammer drills reported costs per foot of hole at 40 c. and 42 c., and one using churn drills with a 7-in. hole reported $3 per ft.

One of the first two quarries did not report the drilling cost per ton of stone, nor did it give data by which the cost could be computed. The other reported a cost of 14 c. per ton of stone. The quarry using the churn drills reported a cost of 6.4 c. per ton of stone, but calculations based on the spacing and depth of hole and height of quarry face together with the given cost of $3 per ft. of hole show 15 tons broken per foot of hole, for which the calculated cost per ton for drilling would be 20 c. In this calculation sandstone is assumed to weigh 150 lb. per cu. ft.

Blasting

Three quarries reported blasting costs. Two of these using hammer-drill holes averaged 8½ c. per ton for blasting, and the third, using 8-in. churn-drill holes, reported 7 c. as the cost per ton of stone.

Loading and Transportation

Only one quarry reported loading costs separately; its costs amounted to 12 c. per ton for hand-loading. The same plant reported a hauling cost of 6 c. per ton, using hand-tramming to the foot of a gravity plane and hoisting by cable.

Another quarry loading by power shovel with a 3-yd. dipper and hauling with 7½-ton trucks reported a combined loading and hauling cost of 18 c.

TABLE 13. SANDSTONE QUARRY COSTS

Loading method	No. of quarries	Average wage per man-hr.	Average total labor cost per ton	Average quarry cost per ton	Average crushing and screening cost per ton	Average total operating cost per ton	Average total overhead cost per ton	Average total cost per ton
Hand-loading	4	$0.48	$0.85	$0.88	$0.19	$1.07	$0.28	$1.35
Shovel-loading	2	.33	.30	.64	.12	.76	.70	1.46
Hand-loading	7	.47	.83	.91	.....	.....	.....	.....
Shovel-loading	4	.42	.30	.80	.....	.....	.....	.....

Crushing

Four quarries segregated their crushing costs, which averaged 20 c. per ton.

All four plants use jaw-type crushers for initial breakers, three of small size and one large. One plant reported the use of gyratory and disk-type units for secondary crushing.

No data is available as to ratios of reduction.

Only one plant reported a secondary crushing cost, which was 4 c. per ton or 25% of the total crushing cost.

Conclusion

The data above was taken from reports of 12 quarries, located in four states, which indicated an average annual production of 630,000 tons of sandstone or 14% of the United States production in 1927.

Granite

The term "granite" as defined for this study includes other hard rocks such as syenite, quartzite, etc. As found in nature, some of these rocks are quite thoroughly shattered and cracked, although not broken from their original position. This shattered condition obviously has an important bearing on the cost of breaking, as less drilling and explosives are required. Comparisons made in the following tables will take this feature into account as far as possible.

The principal market for granite is as dimension or building stone, but quarries producing this type of granite were not solicited for costs.

Replies were received from seven granite quarries preparing crushed stone for market. Of these seven quarries, five gave cost details which are used in the tables. The other two were so out of line for various reasons that their inclusion would only tend to confuse the results. In presenting the tonnage produced per man-hour, all seven reports are used.

As may be expected with only a small number of reports from which data are available, many details are necessarily omitted in order to avoid publication of individual figures.

Production

As a basis of comparison the tonnage produced per man-hour worked is often more informative than the costs per ton. With this in view, Table 16 has been prepared in which information from all seven reporting quarries is tabulated.

The blank parts of the table represent either a lack of information or cases in which only one quarry is involved, so that

TABLE 14. GRANITE QUARRY PERCENTAGE COSTS

Tons produced daily	0–200		1000–1500		Over 2000	
Method of loading and cost details: Per cent of	Operating cost	Total cost	Operating cost	Total cost	Operating cost	Total cost
Hand-loading:						
Number of quarries	2		..		..	
Wage cost	69	59	....	....	....	....
Quarry cost	79	68	....	....	....	....
Crushing and screening cost	21	18	....	....	....	....
Total operating cost	100	86	....	....	....	....
Overhead cost	....	14	....	....	....	....
Total cost	....	100	....	....	....	....
Shovel-loading:						
Number of quarries	..		2		1	
Wage cost	....	....	39	32	53	34
Quarry cost	....	....	68	56	53	34
Crushing and screening cost	....	....	32	26	47	30
Total operating cost	....	....	100	82	100	64
Overhead cost	....	....	....	18	....	36
Total cost	....	....	....	100	....	100

TABLE 15. GRANITE QUARRY COSTS

Loading method and daily production	No. of quarries	Average wage per man-hr.	Average total labor cost per ton	Average quarry cost per ton	Average crushing and screening cost per ton	Average total operating cost per ton	Average total overhead cost per ton	Average total cost per ton
0–200 tons:								
Hand-loading	2	$0.48	$0.90	$1.03	$0.28	$1.31	$0.21	$1.52
1000–1500 tons:								
Shovel-loading	2	.48	.33	.58	.27	.85	.19	1.04

TABLE 16. GRANITE QUARRY PRODUCTION

Daily production	Loading method H = hand S = shovel	Average wage per man-hour	Days worked yearly	Average height of quarry face, feet	Average production in tons per man-hour: In quarry	In crushing plant	In other labor	In total labor	Average operating cost from Table 15	Average total cost from Table 15
0–200 tons:										
No. of quarries reporting		3	3	2	3	3	1	3	2	2
	H	$0.48	170	70	0.55	3.4	6.2	0.46	$1.31	$1.52
No. of quarries reporting		1	1	..	..	..	..	..	..	..
	S	.56	215	....	.94	....	....	.94	.....	.....
1000–1500 tons:										
No. of quarries reporting		2	2	2	2	2	2	2	2	2
	S	.48	178	150	4.41	15.5	8.2	2.35	.85	1.04
Over 2000 tons:										
No. of quarries reporting		1	1	1	1	1	1	1	1	1
	S	.92	267	170	9.68	33.4	23.0	5.66	.....	.....

publication would expose individual figures.

As may be expected, the tonnage per man-hour is greater in quarries using shovels. This figure also increases as the daily production increases.

Stripping

Only four quarries segregated their stripping costs. One quarry using auto trucks gave $1 per cu. yd. as the total cost, but did not designate the method of excavation nor distance hauled. Several gave the distance hauled but no costs. One gave 50 c. per cu. yd. and 5 c. per ton of stone in removing 20 ft. of clay from 140 ft. of stone by contract, using scrapers, without notation of the length of haul. Another reported 1¼ c. per ton of stone for a 200-ft. haul in removing 5 ft. of clay from 160 ft. of stone, using a small power shovel and tramming by hand. This is the equivalent of 91 c. per cu. yd. or 45 c. per cu. yd. per 100-ft. of haul.

Another gave $0.007 per ton of stone as the cost of removing 40 ft. of clay from 170 ft. of stone by hydraulic methods with a 5000-ft. haul through flumes. This is the equivalent of $0.066 per cu. yd. of overburden or $0.0013 per cu. yd. per 100-ft. of haul. (This calculation is based on granite as weighing 168 lb. per cu. ft. in place.)

Drilling

Four quarries segregated their drilling costs. One using hammer drills with 1½-in. holes 10 ft. deep reported a cost of 50 c. per ft. of hole drilled. One reported using the tunnel or coyote method of breaking, but gave no segregated costs.

Two quarries using churn drills, cutting 6-in. holes to an average depth of 185 ft., averaged $1.55 per ft. of hole and 5½ c. per ton of stone, with secondary drilling costing 8 c. per ton, making the total drilling cost 13½ c. per ton of stone. Another quarry using the bench-and-toe method of shooting with piston drills, cutting 3-in. holes 22 ft. deep, reported a drilling cost of 2 c. per ton of stone produced. The stone in this latter quarry is not to be compared with the solid granites because of its fractured nature.

Blasting

One quarry that uses the coyote or tunnel method of shooting reports a blasting cost of 15 c. per ton. It is not clear whether or not this figure included the cost of driving the tunnels, but it probably does. Therefore the 15 c. should be drilling and blasting expense. The explosive reported was 40% gelatin.

Three quarries using 6-in. churn-drill holes reported blasting costs averaging 7.7 c. per ton of stone, with 40% and 60% starch and nitroglycerin explosives.

The one quarry using the bench-and-toe method of drilling fractured stone with piston drills reported a blasting cost of 2 c. per ton, using 20% and 40% starch explosives.

Loading and Transportation

Two quarries segregated their loading and transportation costs and three gave these costs combined.

One plant using both hand and power shovel loading reported 19 c. for hand, 11 c. for shovel and 10 c. for transportation.

The second with a larger production reported a shovel-loading cost of 5 c. and a transportation cost of 4 c.

Two plants loading and tramming by hand averaged 25 c. per ton, and one reported a total shovel-loading and transportation cost of 14 c. The average shovel-loading and transportation cost of the three quarries was 15 c. per ton.

Type and size of shovels used in the above examples are not given in order to hide the identity of the quarries. For the same reason the daily production is not shown.

Crushing

Two quarries reported using small jaw crushers for both primary and secondary breaking, and five gave the gyratory type as their choice for both reduction steps.

All used trommels for initial sizing, one supplemented them with vibrating screens for the finer sizes and one used shaking screens.

Five plants used electric power and two used steam.

Only one plant segregated crushing and screening costs in detail. At this plant with 16-in. gyratory electric-driven initial breakers followed by 12-in. gyratories for secondary crushing and trommel screens, the cost of first crushing from quarry-run size to 4 in. is given as 5.4 c. per ton, of secondary crushing as 6.7 c. and of screening as 2 c. per ton.

Four plants employing gyratory units for all crushing averaged 9 c. for initial and secondary crushing. At these plants the initial break was a reduction from quarry-run size to an average of 4 in. in the first reduction and from that to the usual commercial sizes in the secondary step.

No crushing costs were given for those plants using jaw-type crushers.

Conclusion

The preceding discussion of granite quarry costs represents details received from seven quarries having a total annual production of 1,130,000 tons, or 12½% of the granite produced in 1927 for other than dimension-stone uses.

The seven quarries were located in six different states, ranging well over the country from east to west and north to south.

Preparation Common to All Three Kinds of Stone

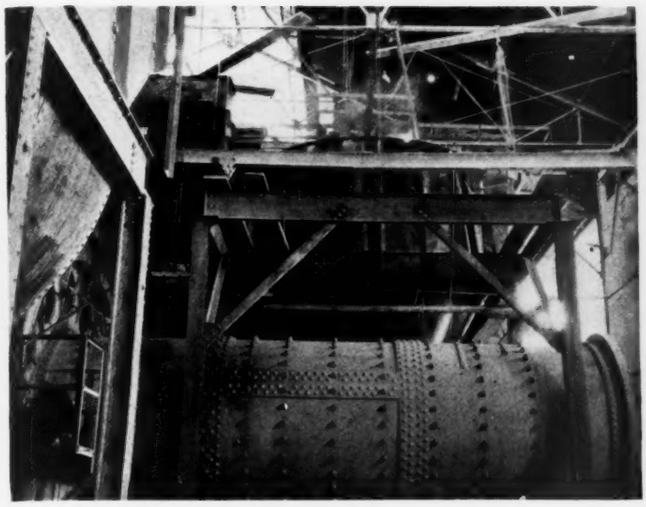
WASHING AND DRYING—No trap-rock quarries reported washing or drying stone. One sandstone operator reported the use of bowl classifiers but gave no cost figures. One granite quarry reported a washing cost of ½ c. per ton but gave no details as to methods or equipment used.

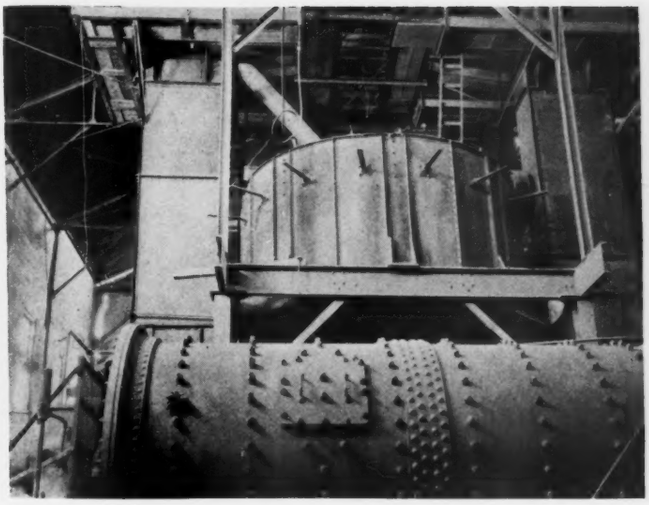
SCREENING—In general the screening, elevating and conveying costs at trap, sandstone and granite quarries were not segregated but were combined in the crushing costs. The few plants which did show screening separately averaged 3 c. per ton; using cylindrical or trommel screens in each case. Shaking and vibrating screens were employed in some cases to supplement the trommels, but costs were not reported. One plant used trommels with square screen openings.

One item of interest is that only one producer reported separating fine material from lump prior to feeding quarry-run material to the initial crushers. For the larger crushing units, with overcapacity, this is of small consequence, but where the capacity of the first crusher is taxed by the production required, conditions might be improved by installing a stationary grizzly ahead of the crusher to remove the smaller material and by-pass it direct to the second stage crushers.

ELEVATING AND CONVEYING—Elevating as reported by a small number of trap, sandstone and granite quarries ranged from 1½ c. to 3 c. per ton, while the cost of conveying ranged from 1 c. to 9 c. The greater spread in conveying costs is occasioned by plant design, some requiring much more such transportation than others.

STORAGE—Several plants reported storage costs but did not differentiate between the cost of placing stone in storage and the cost of its recovery. Total storage costs averaged 8.3 c. per ton. Where in and out costs were given they averaged 3.7 c. into storage and 5.8 c. for recovery from storage.





Two photographs taken during the installation of a 14-ft. separator to be used in connection with a compeb mill for raw grinding in the Diamond Portland Cement Co. plant at Middlebranch, Ohio

Improved Grinding Methods at the Diamond Portland Cement Co.

FOLLOWING a year's operation of an air separator unit in connection with one of the compeb mills in the raw-grinding department, the Diamond Portland Cement Co., at its Middlebranch, Ohio, plant has recently installed a second air separator unit to handle the balance of the material in the raw grinding end.

This installation is one of a number of changes and improvements the company has made from time to time to improve the quality of its product and the efficiency of its operation by taking advantage of improved methods in the industry.

Although one of the oldest, if not the oldest, portland cement plant in the state, having been operated since 1892, its various departments have been almost entirely rebuilt since that time. It has remained a dry-process plant.

The raw grinding was formerly done with three 7-ft. by 24-ft. Allis-Chalmers compeb mills, and the finish grinding also in three mills of the same type and size. Each mill is driven by a 450-hp. Allis-Chalmers synchronous motor with Cutler-Hammer magnetic clutch. Two 10-ft. by 150-ft. kilns are used for the burning.

Something over a year ago a 14-ft. Sturtevant air separator was installed on one of the compeb mills, operating in closed circuit with it, with such satisfactory results that a second separator unit recently has been installed on the second compeb mill connected up in the same way. These two mills with separators are able to easily handle the raw grinding on part time without operating the third mill.

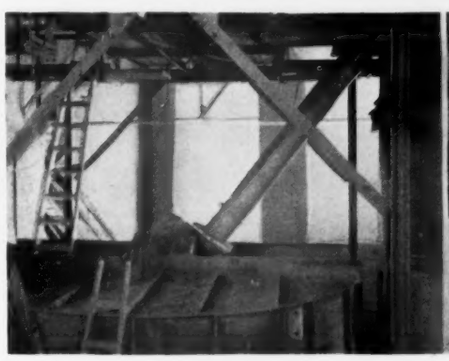
Previously one compeb mill produced 17 to 18 tons of finished product per hour, but with the separator in circuit, the output is 22 to 23 tons of finished product per hour, an increase of about 25%.

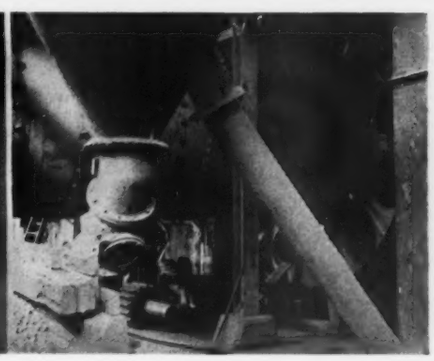
The material going to the separator from the compeb mill discharge shows a fineness of 52% minus 200-mesh and 73% minus 100-mesh, while the finished product separated out shows a fineness of 88 to 89% minus 200-mesh and 97% minus 100-mesh. The tailings returned to the mill from the separator are of a fineness such that 15 to 16% pass 200-mesh and 46% pass 100-mesh.

The total circulating load in the mill is approximately 46 tons per hour of which 22 tons per hour is finished product and 24 tons tailings.

Each separator is belt-driven by a 35-hp. induction motor located on top, and is fed by a steel-encased chain-bucket elevator, which carries the product discharged by the compeb mill up and spouts it to the center of the separator. The tailings are spouted from a point near the bottom of the cone of the separator, and returned to the mill by the steel-encased elevator that delivers the raw material to the feed bin. The finished product from the bottom of the cone is spouted to a screw conveyor and then elevated to the storage silos.

H. D. Raff is vice-president and general manager, and W. W. Kinginger is chief chemist.





At left is a top view of the separator. Feed spout and elevator can be seen. Right, bottom view. Taken during course of installation

Price Study of Cement Industry Progressing

THE FEDERAL TRADE COMMISSION announces that cement purchase data for 1929 is still being received from state highway commissions. As quickly as possible it is being worked into shape for incorporation with data already tabulated.

Recent Japanese Research in Portland Cements

Reviewed for Rock Products

By William A. Ernst

Chief Chemist, South Dakota State Cement Plant, Rapid City, S. D.

STUDIES ON HIGH-IRON-OXIDE PORTLAND CEMENTS

By SHOICHIRO NAGAI and KEIICHI AKIYAMA

High-iron-oxide, or ferro-portland, cements are classified in two kinds, according to the amount of iron oxide. The first is so-called "Eisenzement" or "Erzzement," in which iron oxide predominates over alumina in ordinary portland cement. The second is so-called "Kuhlzement," in which the iron oxide is contained to the amount of 6-8%, nearly equal to alumina. In this article the authors have considered the second class of high-iron oxide cements.

(*a*) One kind of Japanese puzzolana was found to contain silica, alumina and iron oxide in proper proportions to prepare the high-iron-oxide portland cement of the "Kuhlzement" type, with limestone.

(*b*) The raw mixtures were obtained from these two samples of puzzolana and $CaCO_3$, or limestone.

(*c*) The raw mixtures were heated at various temperatures over 900 deg. C. and the heated products were systematically examined on the points of specific gravity, the amounts of insoluble residue, free lime and combined lime.

The results show that at 1350 deg. C. the combination was seen to be completed.

Temperature	Time in minutes	Specific gravity
At 900 deg. C.	60	3.15
At 1350 deg. C	60	3.25

Insoluble residue	Free lime	Combined lime
14.30%	96.0%	4.0%
0.35	0.0	100.0

(*d*) Actual cinkers were prepared from the above raw materials and ground with 2.5-3.5% of gypsum. These prepared samples of high-iron portland cement were compared on their composition and various moduli, or indices, with two samples, A and B, of "Kuhlzement" prepared at a certain cement manufacturing plant in Japan.

(*e*) These five samples of high-iron portland cement were tested for their strength of 1:3 cement and sand mortars, by the ordinary testing method (Japanese standard specifications for portland cement), and then by the small-piece testing of compressive strength. The comparison of results of compressive strength of mortars tested by the small-piece testing method is shown in the following table:

COMPRESSIVE STRENGTH OF 1:3 HIGH-IRON-OXIDE PORTLAND CEMENT SAND MORTARS COMPRESSIVE STRENGTH (KG./CM.²) BY SMALL-CYLINDRICAL TEST PIECES

No. of Sample	3 days	7 days	28 days	Combined 28 days
201	24.9	35.4	59.0	56.7
202	30.5	64.1	76.0	95.1
401	53.3	69.2	85.2	120.6
A	42.6	59.5	103.1	141.1
B	39.9	48.2	100.0	111.8

COMPRESSIVE STRENGTH (KG./CM.²) OF ORDINARY CUBES (7.07 CM.³) TEST PIECE

No. of Sample		3 days	7 days	28 days	Combined 28 days
202	Calculated results	452	506	540	589
401	" "	454	519	562	627
A	Experimental results	398	472	568	650
B	" "	478	487	597	658

ANALYSIS OF JAPANESE PUZZOLANA

No. of Sample	Loss on ignition	Insoluble residue	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3	Specific gravity
1	17.50%	51.29%	36.95%	23.89%	19.75%	0.89%	0.75%	trace	2.362%
2	18.47	50.13	35.86	23.03	20.85	0.13	0.21	0.40	2.371

The calculated results were obtained by multiplying the ratio *C/c* by the results of the compressive strengths of the small-piece tests. (For the ratio *C/c* see the *Journal of the Society of Chemical Industry*, Japan, Vol. 32, July, 1929, 191 B).

The studies on high-iron portland cement were continued, using loamy clays, pyrite cinders, slags, etc.

(*a*) One kind of Japanese puzzolana, "Asama Kazambai" at Assama in Nagano Perfecture, contains large amounts of silica and alumina, but little iron oxide; therefore copper slag from copper metallurgy, which contains large amounts of silica and iron oxide, must be used to adjust the composition of the puzzolana.

(*b*) One kind of loamy clay, which was obtained in the suburbs of Tokyo, contains large amounts of silica, alumina and iron oxide in proper proportion to be used for the preparation of the high-iron-oxide portland cement of the "Kuhlzement" type.

(*c*) The raw mixtures were obtained from the above materials. The puzzolana, or loams, were mixed with $CaCO_3$ or limestone.

(*d*) The raw material was heated at various temperatures above 900 deg. C. and the heated products were systematically examined on the points of specific gravity, amount of loss on ignition, free and combined lime, etc.

SAMPLES FROM NO. 601-607

No. of Sample	Temperature	Time in minutes	Specific gravity	Loss on ignition	Free lime	Combined lime
601	900 deg. C.	60	2.80	37.5%	96.2%	3.8%
607	1400 deg. C.	60	3.10	38.3	0.0	100.0

The results were tabulated and it was found that combination for 601-607 was complete between 1350 and 1400 deg. C.

(*e*) Clinkers were prepared from some of the raw mixtures by sintering at about 1320-1350 deg. C. These clinkers were ground with 2.5-3.5% of gypsum in a porcelain pot mill and compared for their chemical composition, etc. (501-701-801-901).

No. of sample	Loss on ignition	Insoluble residue	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3	Free CaO
501	.56%	0.70%	18.36%	5.65%	9.15%	64.77%	0.11%	2.83%	0.68%
701	1.03	1.01	16.31	9.93	7.04	62.06	0.56	2.72	0.00
801	1.07	1.21	15.06	8.69	10.43	63.40	0.10	2.78	2.48
901	0.99	0.98	16.20	9.12	10.38	59.41	0.13	2.91	1.78

These four samples of the high-iron-oxide portland cement were tested on their strengths of 1:3 cement-sand mortars by the small-piece testing of compressive method, with the following results:

COMPRESSIVE STRENGTH (KG./CM.²) BY SMALL-PIECE TESTING METHODS

No. of Sample	3 days	7 days	28 days	Combined 28 days
501	27.4	66.5	111.6	158.2
701	63.4	82.6	119.8	148.4
801	71.9	100.0	131.4	154.9
901	50.3	125.0	127.8	148.0

Further studies on high-iron-oxide portland cements were made, using (1) one kind of colloidal earth containing a large amount of silica and alumina in soluble form. This was mixed with copper slag and limestone, to prepare a raw mixture. (2) A loam (*b*) as reported above was mixed with limestone to make a raw mixture (Table No. 1).

The raw mixture (11) is unfit to make a clinker of high-iron-oxide portland cement of the "Kuhlzement" type, unless a certain raw material of high-iron-oxide content, as copper slag or pyrite cinder, is added.

These raw mixtures were sintered as in the above cases to clinker at 1320-1350 deg. C. and ground with 3% of gypsum in a porcelain pot mill. The prepared sample of high-iron-oxide portland cements (1001) and (1101) were compared on their chemical composition, etc., as shown in Table No. 2.

The cements (*C*) and (*D*) were the testing samples, which had been prepared at another cement manufacturing company.

These four samples of the high-iron-oxide portland cement were tested for their strengths of 1:3 cement-sand mortars by the small-piece testing method of compressive strength. The results were tabulated in Table No. 3.

The sample (1101) gave the lowest strength, owing to its inappropriate chemical composition shown in Table No. 3.

Five samples of raw mixtures were prepared from pure chemicals, silica, alumina, ferric oxide, and calcium carbonate. They were sintered at 1320-1350 deg. C. and the clinkers were ground as before. These samples were tested for their chemical compositions, moduli, and indices between these compositions, and compressive strength of 1:3 cement-sand mortars, by the small-piece testing method (Table No. 4).

By these results it is clear that samples (1101) and (D_3) had the lowest values of compressive strength, and (C_3) and (E_3) had the low strengths at short curing ages (3 and 7 days), but increased considerably their strengths at long curing ages (28 days or longer), owing to the slow hardening of dicalcium silicate.

STUDIES ON FUNDAMENTAL SYNTHESIS OF CALCIUM ALUMINATES AND THEIR HYDRATION

By SHOICHIRO NAGAI and RYUICHI NAITO

In previous papers the authors reported the results of tests of strengths of 1:3 mortars of synthesized aluminates $3CaO{\cdot}Al_2O_3$ and $3CaO{\cdot}5Al_2O_3$, also comparison of the relative solubilities of four aluminates, $3CaO{\cdot}Al_2O_3$, $5CaO{\cdot}3Al_2O_3$, $CaO{\cdot}Al_2O_3$ and $3CaO{\cdot}5Al_2O_3$ in water.

The chief summary of the present paper is as follows:

(1) Pure aluminates of the highest lime content, $3CaO{\cdot}Al_2O_3$, and the lowest lime content, $3CaO{\cdot}5Al_2O_3$ were synthesized and had the composition and properties shown in Table No. 5.

A326 ($3CaO{\cdot}Al_2O_3$) was partially melted, but A327 and A812 did not sinter. It is clear that in the tri-calcium aluminate there remains a little free lime which does not combine completely even in the melted sample, owing to the large proportion of lime.

Tests on the compressive strengths of these two aluminates were carried out, and compared with those of the other two aluminates $5CaO.3Al_2O_3$ and $CaO.Al_2O_3$ as shown in Table No. 6.

By these results the relative strengths of the four aluminates are clearly compared. (1) $CaO{\cdot}Al_2O_3$ has the highest strength at first, but is overtaken by the $3CaO{\cdot}5Al_2O_3$ at 7 days. (2) $3CaO{\cdot}5Al_2O_3$ has somewhat smaller strength at first but increases steadily and predominates the $CaO{\cdot}Al_2O_3$ at 7 days. (3) $5CaO{\cdot}3Al_2O_3$ is the third and increases its strength gradually. (4) $3CaO{\cdot}Al_2O_3$ has the lowest value of strength, and increases in small amounts at 7 and 28 days.

TABLE NO. 1. PROPORTIONS AND COMPOSITIONS OF RAW MIXTURE

No. of sample	Proportion of raw material (in weight parts)	Chemical compositions (ignited) SiO_2	Al_2O_3	Fe_2O_3	CaO
(10)	Colloidal earth 100, Copper slag 100, Limestone 446	18.06%	8.87%	9.06%	64.00%
(11)	Loam (*b*) 100, Limestone 224	24.85	7.53	4.50	63.00

TABLE NO. 2. COMPOSITIONS OF HIGH-IRON-OXIDE PORTLAND CEMENTS

No. of sample	Loss on ignition	Insoluble residue	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3	Free CaO
(1001)	1.01%	0.38%	18.41%	7.12%	9.09%	62.51%	0.55%	2.54%	0%
(1101)	1.08	0.59	23.21	8.96	4.98	62.80	0.34	2.80	0
(*C*)	4.91	1.61	17.78	7.08	7.04	60.10	0.26	2.05	0
(*D*)	0.79	1.88	19.82	7.18	7.28	61.77	1.57	2.16	0

TABLE NO. 3. COMPRESSIVE STRENGTH OF 1:3 HIGH-IRON-OXIDE PORTLAND CEMENT-SAND MORTARS BY SMALL-PIECE TESTING

No. of sample	Compressive strength (kg./cm.²) by small cylindrical test-piece method 3 days	7 days	28 days	Combined—28 days
(1001)	56.0	108.2	165.3	182.6
(1101)	2.9	3.3	3.2	7.2
(*C*)	38.6	81.2	123.8	115.8
(*D*)	46.8	96.2	163.7	185.3

TABLE NO. 4. CHEMICAL COMPOSITION OF HIGH-IRON-OXIDE PORTLAND CEMENT PREPARED FROM PURE CHEMICALS

No. of sample	Loss on ignition	Insol. residue	SiO_2	Al_2O_3	Fe_2O_3	CaO	SO_3	Free CaO
A_3	0.72%	0.72%	14.89%	9.00%	10.21%	63.18%	1.12%	0%
B_3	0.75	0.14	16.54	8.86	8.39	62.91	1.56	0
C_3	0.57	0.38	16.95	11.47	11.17	58.16	1.68	0
D_3	0.84	0.04	18.94	10.29	8.34	61.13	1.72	0
E_3	0.75	0.31	18.58	6.00	13.47	59.40	1.75	0

SPECIFIC GRAVITIES AND COMPRESSIVE STRENGTHS OF THE ABOVE CEMENTS

No. of sample	Specific gravity	Compressive strength (kg./cm.²) by small-cylinder test-piece method 2 days	7 days	28 days	Combined 28 days
A_3	3.21	45.2	83.6	100.0	164.0
B_3	3.16	36.7	64.8	154.7	165.7
C_3	3.24	13.7	23.0	108.0	54.8
D_3	3.20	2.3	9.9	26.6	20.5
E_3	3.23	11.5	17.5	118.7	60.2

AMOUNTS OF SILICATES, ALUMINATES AND FERRITES, AND RATIO OF LIME TO SILICA

No. of sample	$3CaO{\cdot}SiO_2$	$2CaO{\cdot}SiO_2$	Total silicates	$3CaO{\cdot}Al_2O_3$	$2CaO{\cdot}Fe_2O_3$	Molar ratio of lime to silica	Lime silica ratio
(*A*)	45.6%	10.1%	55.7%	20.8%	12.9%	2.77	2.57
(*B*)	3.2	46.1	49.3	21.8	20.9	2.05	1.91
(202)	27.2	23.6	50.8	30.7	14.7	2.52	2.36
(401)	38.7	15.6	54.3	26.3	15.7	2.65	2.48
(501)	53.6	10.7	64.3	15.0	15.6	2.79	2.60
(701)	40.5	14.0	54.5	26.3	12.0	2.68	2.50
(801)	45.0	6.5	51.5	23.0	17.7	2.83	2.65
(901)	18.6	30.2	48.8	24.2	17.6	2.31	2.16
(1001)	36.1	24.8	60.9	18.9	15.5	2.52	2.35
(1101)	0.6	64.9	65.5	23.7	8.5	2.00	1.87
(*C*)	45.9	12.8	58.7	18.8	12.0	2.73	2.55
(*D*)	37.2	24.5	61.7	19.0	12.4	2.53	2.36
A_3	55.0	0.0	55.0	23.9	17.3	3.00	2.80
$B_3CaO{\cdot}SiO_2$	43.4	14.5	57.9	23.5	14.3	2.69	2.52
C_3	1.9	45.2	47.1	30.4	19.0	1.94	1.82
D_3	7.9	48.4	56.3	27.3	14.2	2.11	1.97
E_3	18.8	38.5	57.3	15.9	22.9	2.27	2.12

TABLE No. 5. COMPOSITION AND PROPERTIES OF ALUMINATES $3CaO \cdot Al_2O_3$ AND $3CaO \cdot 5Al_2O_3$

No. of sample	Chemical formula	Specific gravity	Free lime	Combined lime	Combined alumina	Molar ratio of combined CaO to Al_2O_3	Insoluble residue
A812	$3CaO \cdot 5Al_2O_3$	2.86	0.00%	24.84%	74.40%	0.61	0.76
A326	$3CaO \cdot Al_2O_3$	2.97	1.85	60.14	37.69	2.91	0.32
A327	$3CaO \cdot Al_2O_3$	2.94	3.00	59.35	37.65	2.87	0.00

TABLE No. 6. COMPARISON OF COMPRESSIVE STRENGTHS OF 1:3 MORTARS BY SMALL-PIECE TESTING METHOD

No of sample	Formula of aluminates	Compressive strength ($kg./cm.^2$) by small-cylinder test-piece 1 day	2 days	3 days	7 days	7 da. in air. 28	25.8	28 da. in air 28	Comb. 82.8
A326	$3CaO \cdot Al_2O_3$	11.5	10.8	10.6	20.2	54.0		54.3	
A327	$3CaO \cdot Al_2O_3$	10.6	9.9	9.4	13.1	48.2	18.3	46.3	96.0
A512	$5CaO \cdot 3Al_2O_3$	30.9	35.8	44.8	74.0	75.1	94.2	66.7	149.3
A120	$CaO \cdot Al_2O_3$	92.8	91.2	97.3	103.9	204.2	85.2	152.9	235.4
A812	$3CaO \cdot 5Al_2O_3$	33.0	55.8	72.3	123.0	103.7	139.7	98.6	223.6

TABLE No. 7. CHARACTERS OF FOUR ALUMINATES

No. of sample	Chemical formula	Specific gravity	Free lime	Insoluble residue	Combined lime	Combined alumina	Molar ratio CaO/Al_2O_3	Size of ball Dia. mm.	Wt. grms.
A323	$3CaO \cdot Al_2O_3$	2.97	0%	0.00%	62.30%	37.70%	3.01	11.7	1.321
A513	$5CaO \cdot 3Al_2O_3$	2.79	0	0.14	47.72	52.14	1.67	13.0	1.020
A121	$CaO \cdot Al_2O_3$	2.88	0	1.43	35.72	62.85	1.04	12.9	1.924
A813	$3CaO \cdot 5Al_2O_3$	2.87	0	1.10	24.94	73.94	0.62	13.1	1.515

TABLE No. 8. AMOUNTS OF LIME AND ALUMINA DISSOLVED FROM ALUMINATES IN DISTILLED WATER

Ages in days		$3CaO \cdot Al_2O_3$ Lime and alumina	Molar ratio $CaO \cdot Al_2O_3$	$5CaO \cdot 3Al_2O_3$ Lime and alumina	Molar ratio $CaO \cdot Al_2O_3$	$CaO \cdot Al_2O_3$ Lime and alumina	Molar ratio $CaO \cdot Al_2O_3$	$3CaO \cdot 5Al_2O_3$ Lime and alumina	Molar ratio $CaO \cdot Al_2O_3$
		Theoretical	3.00		1.67		1.00		0.60
1	CaO	0.98%	5.42	1.03%	1.40	0.90%	1.12	0.82%	1.21
	Al_2O_3	0.33		1.34		1.47		1.24	
3	CaO	1.29	5.10	1.30	1.46	1.27	1.22	0.55	1.32
	Al_2O_3	0.46		1.80		1.90		0.76	
7	CaO	1.82	3.90	1.11	1.77	0.61	1.43	0.62	1.38
	Al_2O_3	0.85		1.14		0.78		0.82	
14	CaO	2.00	3.51	1.24	2.77	0.51	1.63	1.06	1.37
	Al_2O_3	1.04		0.82		0.57		1.41	
28	CaO	2.51	3.34	1.58	2.70	0.69	1.52	1.45	1.34
	Al_2O_3	1.37		1.07		0.83		1.96	
Total									
	CaO	8.60	3.87	6.26	1.85	3.98	1.31	4.50	1.32
	Al_2O_3	4.05	(mean)	6.17	(mean)	5.55	(mean)	6.19	(mean)
Grand total		12.65		12.43		9.53		10.69	

The most important points are the amounts of increase of strength at 7 and 28 days air curing and 28 days combined curing. The amount of difference of these strengths in air or combined curing to those in water curing of the same ages are mainly due to the character of hydration and hydration products of the four aluminates.

Preliminary studies of hydration tests of the pure synthesized aluminates were carried out by the comparison of solubilities or dissolved amounts of lime and alumina from sintered balls of four aluminates in pure distilled water. The characters of the aluminates are shown in Table No. 7 and the amounts of dissolved lime and alumina are shown in Table No. 8.

The dissolved parts of $3CaO \cdot Al_2O_3$ increased gradually, and the molar ratio of lime to alumina decreased step by step and became nearly equal to 3.00.

On the contrary, the molar ratio of lime to alumina in the dissolved parts of $5CaO \cdot 3Al_2O_3$ gradually increased and became nearly equal to 3.00.

By these results it is clear that the hydrated products of $3CaO \cdot Al_2O_3$ and $5CaO \cdot 3Al_2O_3$ are to be hydrated tricalcium aluminate $3CaO \cdot Al_2O_3 \cdot nH_2O$. But the molar ratios of $CaO \cdot Al_2O_3$ and $3CaO \cdot 5Al_2O_3$ were distinctly smaller and did not increase above 1.50, which shows the difference of hydrations or hydrated products between these two aluminates of lower lime content and those of higher lime cement.—*Institute of Silicate Industry, Department of Applied Chemistry, Faculty of Engineering, Tokyo Imperial University.*

Healthy Unrest [in the Cement Industry]

(An Editorial in *Engineering News-Record.*)

THE cement industry, both producing and consuming, is beset with conflicting doubts in so far as specifications are concerned. Various signs of unrest were apparent at different times during the convention of the A. S. T. M. last week, but in the main they must be considered healthy. It was evident that some feel the revision of the standard specification for Portland cement, which raises the tensile strength requirements, to be only a curtain-raiser for more general and radical developments. In a measure this feeling is supported by news of the reorganization of committee C-1, the cement specification body of the society, whose new set-up provides subcommittees to deal with new cements appearing on the market as well as to handle more effectively the current specifications on standard portland, high-early-strength portland and natural cements. Another indication of this state of unrest was the animated discussion, pro and con, which accompanied a suggestion that the cement committee develop more direct contacts with large consuming interests which have seen fit to depart from the standard specification and set up requirements of their own. Such a contact might show whether some of the departures have enough merit for inclusion in the standard specification, or whether they are unreasonable and of little value. Finally, the growing doubt concerning the value of the tensile test of mortar briquets, the basic test of the present standard specification, is significant. Reports which show that many laboratories are working on a substitute test, involving compression specimens of plastic mortar in the shape of cubes or cylinders, were clear evidence of this doubt. Evidently the field of cement is likely to see important developments in the near future. It is equally clear that specification bodies are scheduled for some active days and perhaps some sleepless nights in keeping the cement industry on an even keel with full speed ahead.

Blue Diamond Companies, Los Angeles, Are Reorganized

THE BLUE DIAMOND CORP., LTD., Los Angeles, Calif., a newly formed holding company under the control of interests connected with Consolidated Rock Products Co., has acquired the assets of the following companies: W. C. Hay Corp., Blue Diamond Co., Blue Diamond Cement Co. and Blue Diamond Co. of Nevada.

Properties of the new company include approximately 25 acres in Los Angeles used in the manufacture of plaster products and other building materials. Directors of the new company are: Lee A. Phillips, George I. Cochran, Ford J. Twaits, W. P. Jefferies, L. C. Rollins, W. C. Hay and H. S. Dudley.

The properties include a plaster mill, a gypsum block plant, a steel fabricating plant, a cement clinker-grinding plant, a lime plant, sand and gravel plants and all facilities.

The Pacific Group Co., through which the reorganization was effected, is composed of and officered by Lee A. Phillips, George I. Cochran, Howard Dudley and other officers and directors of the Pacific Mutual Life Insurance Co., with local capitalists.

The properties are located in Nevada, the Imperial Valley and San Gabriel and San Fernando valleys of California. Several of the companies in the new consolidation are due to earlier consolidations effected by Mr. Phillips.

Changes and Developments in the Gravel Industry at Knoxville

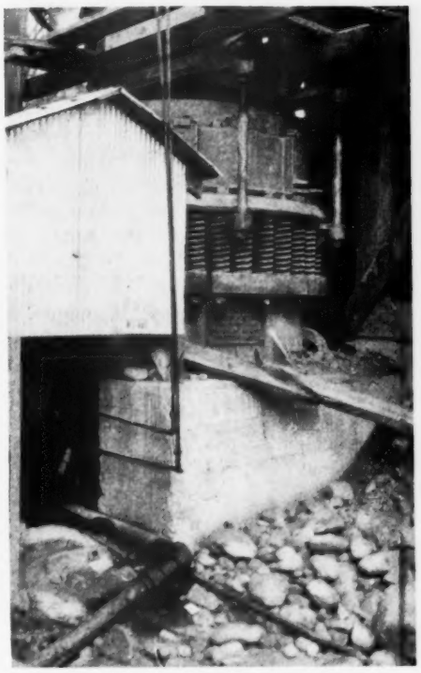
Cherokee Sand and Gravel Co. and Knoxville Sangravl Material Co. Operations in Eastern Tennessee

A DESCRIPTION of the Cherokee Sand and Gravel Co.'s plant at Knoxville, Tenn., was published in the September 17, 1927, issue of ROCK PRODUCTS, so only enough descriptive matter will here be included to give the reader an insight into the reasons for making certain changes and the ultimate result of these departures from what had been the method of operating.

About a year ago this company purchased a 1½-yd. Fairbanks dipper dredge. A considerable percentage of the dredge product is coarse gravel, some chunks weighing upwards of 100 lb., and until a 5-ft. by 10 ft. rotary scalper was installed over the hopper, the oversize discharging to an 18-in. by 36-in. Farrel-Bacon jaw crusher, there were serious delays at the plant. Prior to this there had been simply a hopper that received the gravel from a Clyde stiff-leg derrick, unloaded from flush-deck barges. The rotary scalping screen was mounted as shown over this hopper with the oversize falling to the jaw crusher and the minus 4-in. or throughs, joining the discharge product of jaw crusher. The crusher and rotary screen are belted to a 75-hp. Westinghouse motor. After the problem of coarse material had been solved, it became necessary to increase the secondary crushing capacity and a 48-in. Symons cone was installed, fed by the oversize (plus 1½-in.) from a second rotary screen, the fines from the rotary joining those from the cone crusher. The crusher is belted to a 100-hp. General Electric motor. Previously the crushing equipment would handle only two or three cars per day, while with the present equipment 20 or more cars per day can be obtained.

The crushed gravel and sand from the cone crusher and the fines from the rotary screen ahead are elevated by an inclined belt conveyor to two sets of Gilbert conical, rotary screens. The first screen has an inner cone of 2-in. round perforations and an outer of 1¼-in. round. The conical screen following has ¼-in. square wire cloth. There are two parallel sets of these conical screens. The oversize, passing over a Summit mechanical screen. is returned to the intake belt and to the Symons cone by means of a chute hopper and short conveyor belt. All the conveyors, conical gravel screens and sand cones were supplied by the Stephenson-Adamson Manufacturing Co.

The washed products fall to bins below from which cars or trucks can be loaded. Excess production is carried to a stock pile by a series of belt conveyors with reclaiming done by a Koehring 1-yd. clamshell crane mounted on crawler treads and gasoline engine driven. This crane also is used to help unload material from the river, by means of a trestle ramp, and for general purposes over the plant property. Three Barber-Greene loaders are also a part of the reclaiming equipment.



The secondary crusher installed at the Cherokee plant to increase production

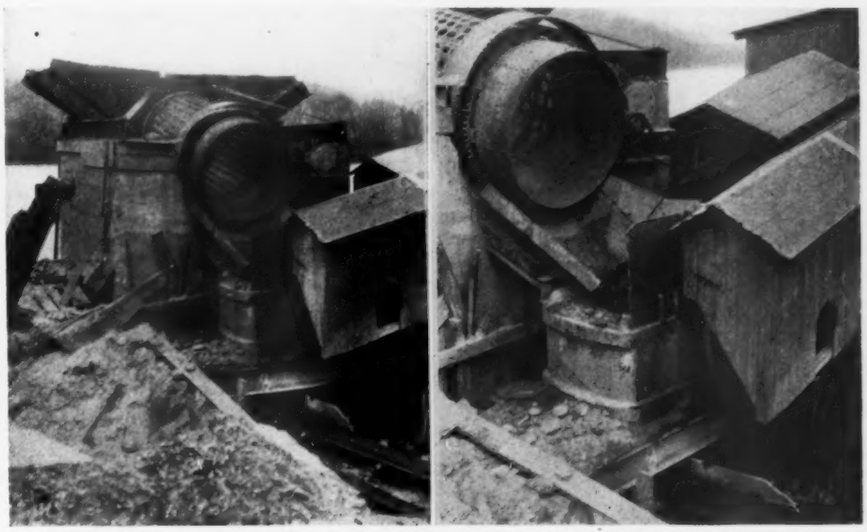
By installing the above equipment four to five men have been eliminated and the plant can now operate continuously, whereas before two to three-hour shutdowns due to the boulders were not uncommon.

The plant and yard offices of the Cherokee Sand and Gravel Co. are on Riverside drive, Knoxville. W. C. Kinzel is president; R. F. McLaughlin is manager. Mr. Kinzel is plant superintendent and his son, W. C. Kinzel, Jr., is superintendent of river operations.

Knoxville Sangravl Material Co.

In the same district the Knoxville Sangravl Material Co. saw benefits to be derived from installing a more modern type of barge unloader in the form of a new "hammer head" crane. This is a derrick having no guylines. It was fabricated by the American Hoist and Derrick Co., and is of steel construction throughout, resting on a concrete base 15 ft. high. The mast is 71 ft. high above water level with a horizontal boom 60 ft. long. The three-drum hoist supplied by the fabricators acts as the counter balance with the entire weight of the mechanism resting on a bronze bearing at the base of the structure. The bearing is directly on top of the concrete base. A 2½-yd. Williams clamshell bucket is used.

By installing this unloader, two old steam rigs were abandoned, thereby cutting down the operation to one man, whereas the old



Scalper at Cherokee installed over old hopper with few changes

steam rigs each required an operator as well as a foreman. Further, a greater efficiency is obtained due to a more mechanically perfect operation. As the rig is electrically driven throughout, it eliminates the smoke nuisance, incidental to coal burning, which in itself is becoming a serious problem in that vicinity.

To expedite the loading of the coal to the river equipment a new reinforced concrete bin has been constructed that feeds a belt conveyor which in turn discharges to a concrete bin at the water's edge, from which the coal is chuted to the boats. The coal is delivered to the plant in gondolas from which an Erie crane unloads it.

The Knoxville Sangravl Material Co. owns and operates the largest steam tow

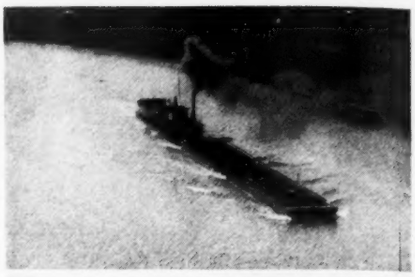
Portable gravel reclaimers are popular in western Tennessee

boat on the river in the vicinity of Knoxville. Its boat, the *Geo. J. Oehler,* has a deck 28 ft. by 134 ft. with the mechanical equipment all supplied by the Chas. Hegewald Co., New Albany, Ind. The boat is steam-driven. The company also recently purchased from the Nashville Bridge Co. three steel barges each having a capacity of 350 tons. They are the only steel barges on the river at this point.

To keep pace with the growing needs of the community, the company has altered the plant so that it can deliver batched aggregates either for paving mixers or, from a separate plant, for transit mixing. For paving work, two Heltzel weighing Agrabatchers have been installed, one for sand and one for gravel, each batcher holding two tons. Kron dial scales are supplied with each batcher. Cement is put on the truck in sacks.

For transit mixing the old bins that were originally constructed to load cars for the street railway company have been provided with a 6-ton Heltzel Agrabatcher, the scale hopper being divided into two compartments, one for sand and one for gravel. The cement is delivered to the plant in sacks which are dumped to the boot of a bucket elevator serving a steel hopper over a Heltzel weighing hopper, which also has a dial scale. The weighing hopper discharges to a short screw conveyor that delivers the cement to the transit mixers. The sand and gravel fall direct to the transit mixers (trucks). As the materials do not combine until they reach the trucks and as their discharges are about 2 ft. apart, a special hopper is provided that is suspended on rollers. By means of this chute-like hopper, the aggregates and cement are delivered to the truck mixers. When not in use the hopper can be run to one side out of the way by means of the suspending rollers. The device also permits trucks to pass without backing up to the spout for loading, as would be the case were this spout stationary. The screening plant is substantially the same as when first built, using a double-coned Gilbert screen, the inner cone having 2-in. round perforations and the outer 1½-in. round opening. The material passing the outer screen splits and goes to two Gilbert screens each having an inner cone with 1¼-in. round and an outer one of ⅜-in. round perforations. The minus ⅜-in. from both screens joins and falls to a small homemade screen on the Gilbert principle, having ¼-in. by ¾-in. slotted wire cloth. The fines from this screen fall to a

The new hammer-head crane installed by the Knoxville Sangravl Material Co. for barge unloading



The "George J. Oehler," said to be the largest steam towboat near Knoxville, owned by Knoxville Sangravl Material Co. at the dock and in action

Stephens-Adamson drag classifier. The various sizes of gravel and sand fall to bins from which the stone can be drawn to trucks, railroad cars or passed by means of an overhead conveyor system to storage piles. Gravel is reclaimed by a belt conveyor operating in a tunnel under the stock piles. A Barber-Greene loader is also available.

A feature of this plant is that any gravel in the stock piles that becomes contaminated with dust or is otherwise not up to standard can be rewashed and resized; a cross belt conveyor has been installed that receives its feed from the reclaiming tunnel belt and delivers the aggregate to the head end of the second set of Gilbert screens in the washing plant.

In addition to the sand secured from the gravel washing plant, a washed sand is delivered at the plant and unloaded direct to stock piles without further washing. This material is dredged from the Tennessee river by small bucket dredges and washed on the boats. This practice is followed by all the sand producers on the Tennessee river at Knoxville.

The plant and offices of the Knoxville Sangravl Material Co. are on Maryville pike. George J. Oehler is president and general manager; W. J. Lang, vice-president; H. N. Nerwin, secretary; L. P. Bittle, assistant secretary, and H. A. Orr, superintendent.

Recent Developments in the Application of Dry Fine Grinding With Air Classification

By Howard G. Wright

Research Engineer, Hardinge Co., New York City, former Chief Engineer of North American Cement Corp.

IT HAS BEEN quite definitely established that it is more important in the preparation of raw material for cement making, to eliminate coarse oversize than to produce superfine, or "flour." Closed-circuit grinding, either wet or dry, gives a product which is classified and more nearly attains the object desired than any other method of grinding.

This discussion will deal with the preparation of raw materials in the dry state by air classification. The ultimate object of air classification in the mill is to remove each particle of rock as soon as it has been reduced to the size which is desired for the particular use to which it is to be put. The attainment of the ultimate object is, of course, impossible in practice, but the reversed current principle of air classification seems to have come nearer the goal than any system yet devised. The per cent of material passing 100-mesh at a fixed per cent minus 200-mesh shows excellent results in this attempt to hold the particle sizes within as narrow limits as possible.

Two Distinct Grinding Operations

There are two distinct operations involved in the reduction of rock from 1-in. and 1½-in. sizes to finished raw material for burning. The first operation is that employing a hammer blow in order to break down a piece of rock and the second is the action of attrition which probably begins at or near a 10-mesh size. For efficient grinding in a ball or tube mill, a large number of small balls is necessary, and for crushing or breaking, larger size balls must be used, depending on the size of the piece to be broken. Therefore, a wide range of reduction should not be attempted in a single mill, as the large balls occupy space and form voids which could be used to better advantage by smaller balls for attrition grinding. It would seem from this consideration that a reduction from ½-in. and finer to 90% minus 200-mesh should be the widest range which can be attempted for economical and efficient operation.

Reversed Current Classification

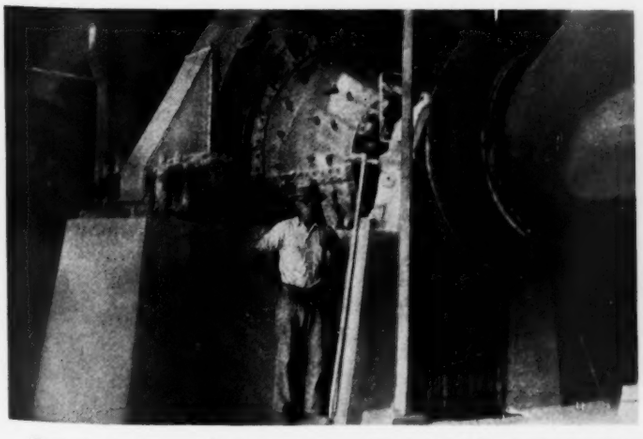
The application of a current of air for the removal of fines from a ball mill or tube mill has been practiced for many years and is usually known as a "wind-swept mill." A more recent development along this line is the reversed current system, whereby a current of air is blown into the mill through a central pipe inside the discharge trunnion of the mill. The air is withdrawn around this pipe and preliminary classification is accomplished within the mill when this abrupt reversal of the air current takes place. A further classification takes place in the rotary classifier located just outside of, and revolving with the mill, and a final classification is effected in the superfine air classifier beyond and above the rotary.

Coarse oversize, which is separated in the rotary and superfine, is dropped into the return air pipe between the fan and the mill, and blown back into the mill for further treatment. A vent pipe is located on the pressure side of the fan to rid the system of any moisture and to compensate for any air that leaks into the system on the vacuum side. From the superfine, the air laden with classified fine product discharges into a product collector of the cyclone type, which separates the air and product. The air freed of its load of fines flows out of the top of the product collector and enters the suction side of the fan which completes the cycle.

This system is capable of producing a product as fine as 98% to 99% minus 325-mesh. In cases where a fineness of not to exceed 75% minus 200-mesh, the rotary and superfine classifier are dispensed with, and the entire classification accomplished within the mill. The critical particle size of the raw material, for cement making, or the size at which rapid combination is accomplished in the kiln, is probably 100-mesh. Therefore, the raw material should screen from 95% to 100% minus 100-mesh in practice. With the reversed current classification system, the classification is positive and a product is secured which conforms closely to that produced in closed-circuit wet grinding, even with variations occurring in the physical characteristics of the mill feed; thus furnishing an ideal kiln feed.

Power Consumption

It has been generally considered that the power used by the fan for a unit of this type would raise the total power in-



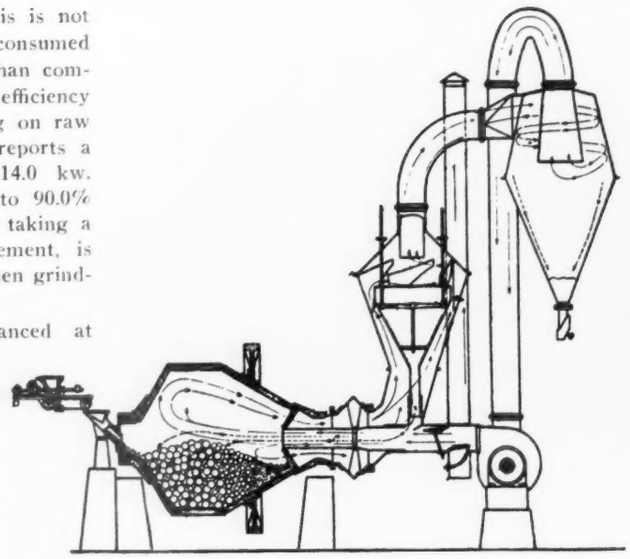
Two typical installations of conical ball mills and superfine air classifiers, the one at the left in the plant of the International Portland Cement Co., Irwin, Wash., and the three at the right in the Santa Cruz Portland Cement Co. plant at Davenport, Cal.

put to a prohibitive figure. This is not true, however, as the power consumed by the fan seems to be more than compensated for by the increased efficiency of the mill. One mill operating on raw rock for cement manufacture, reports a total power consumption of 14.0 kw. hours per ton when grinding to 90.0% minus 200-mesh. Another mill, taking a different rock, but also for cement, is using 14.8 kw. hours per ton when grinding to 89.0% minus 200-mesh.

The theory has been advanced at times, that harmful segregation of materials of varying specific gravities would take place in air classification systems. This, however, is not borne out in fact, as whatever material enters the mill must come out. There probably is a lag in the time of discharge between two widely differing particles, but after the first few minutes of operation, this becomes a constant, and no variation in the condition or qualities of the product is evident. Objections have been raised to the system under discussion on account of losses occurring through the vent stack. There must of necessity be a loss at this point, but it is small and can be reclaimed by the installation of a bag dust collector or by putting into some existing dust-collecting system. At one cement plant, using the reversed current air classification system, this loss is about 0.08 of one per cent, or about 40 lb. per hour on a mill grinding 25 tons per hour.

Lining wear and ball consumption is considerably less for this system than for wet grinding. On one unit, which has been operating for nearly four years on raw rock for a cement plant, the lining shows no visible wear and the operators estimate a life of from ten to twelve years. For a mill grinding raw material which seems to be more difficult to grind than the average, the very low figure of 0.06 lb. per ton is reported for ball consumption.

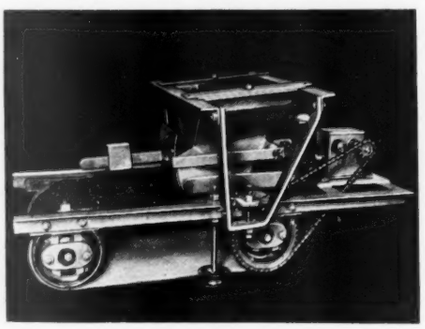
A feed of constant weight is important in getting maximum tonnage through any type of grinding mill, and a constant weight feeder of a type shown in the accompanying illustration has been found especially valuable in correcting the harmful effects of bin segregation, and also in compensating for physical variations in the feed. One feeder in actual operation resulted in an average increase in the capacity of the mill of about 2.5 tons per hour. A mill operator will invariably play safe by running his mill on a light feed, and the constant weight feeder corrects this tendency by automatically holding the feed near the maximum capacity of the unit. If full automatic control is desired, the rate of feed may be automatically controlled by means of an electrical system which is in use at one plant, whereby the rate of feed is regulated by the fluctuations in the mill motor current.



Principle of operation in a reversed current superfine air classifier

Some of the Fine Points in Air Classification

It should be borne in mind that the classification medium, which is air in this case, is much lighter than that used in the case of wet classification. This means that the travel speed of the particles is much faster in the air classification system, and the cleaning and classifying actions must occur very rapidly. This, by the same token, makes the system more sensitive, and adjustments react much more quickly than in the case of a classification carried on in water.



Constant weight feeder important factor for securing maximum tonnage

There is a wide difference in the susceptibility of different materials to the action of air classification. This is apparently due to the fact that some types of nonmetallics stick together, or the coarser particles become coated with finer particles and are extremely hard to clean. Calcined gypsum is a notable example of this class of material which has proven difficult to clean. Raw mix for a cement plant which contains considerable pure calcite seems to act in this way to some extent.

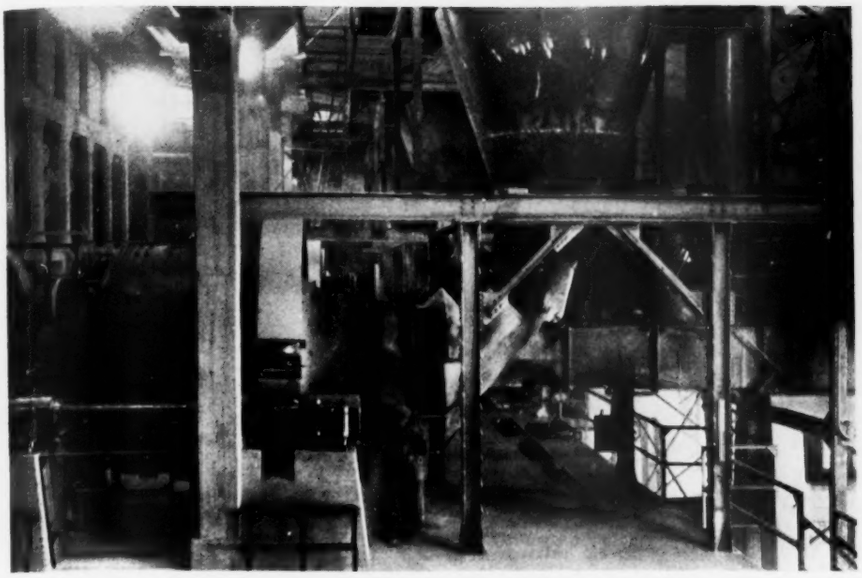
Thorough drying of a material which is to be treated by means of an air classification system is essential for highest efficiencies, as moisture affects the capacity as well as the fineness, although the air classification mill is affected to a less degree than the gravity discharge ball mill. The altitude of the plant in which an air classification mill is to operate has considerable bearing on tonnage and design of the air classification equipment. The greater the altitude, the lighter the air, and as is the case with heated air, the less is its carrying capacity.

Helps Blending Raw Mix

There is an advantage in air classification raw grinding from the chemist's viewpoint, and that is the thorough mixing and blending which the material undergoes in the system from the time it enters the mill till its discharge from the product collector. The turbulence within the mill is very great and must tend to a thorough mixing, and the centrifugal action imparted to the air stream at the top of the superfine classifier must again tend to still further mix the materials. A very valuable feature of the system shown in the accompanying illustration is the fact that the material under treatment does not pass through the fan. The air which returns to the fan from the product collector is dirty, but does not contain enough solid matter to cause any serious wear of the fan blades or casing.

Another good feature is the fact that the finished product can be delivered by gravity from the air seal on the product collector to a bin or conveyor 30-ft. to 50-ft. above the mill. The vertical distance to which the finished material can be delivered may be increased if more power is provided for at the fan. This will usually result in the elimination of one elevator or pump. Variation of the quantity of air for control of fineness of product is not necessary with this system, as a wide range can be gotten by simply raising or lowering the inner cone from outside the superfine classifier.

The circulating load carried in a system producing 24 tons of finished product per hour has been found to be about 60 tons per hour or about 250%. This load will vary some as the fineness of the product is changed. It is also affected by changes in the mill load, which are sometimes made in order to get more or less impalpables in the finished product. As a rule, however, the mill will be operated with a full load, as this condition gives



A 10-ft. by 66-in. conical ball mill and superfine air classifier, grinding raw material in Santa Cruz Portland Cement Co. plant

lowest power consumption per ton. The power necessary for handling the materials in transit is at a minium, due to the fact that the air carries no load from the time it leaves the product collector, through the fan and to a point about half way between the fan and the mill.

A feature of this principle of operation, which does not seem to be very well understood, is the fact that there is no escape of air through the feed spout of the mill. This is prevented by allowing a slightly greater amount of air to escape through the vent pipe than that which leaks into the system. Slight leaks are unavoidable, and the ideal adjustment is a condition where there is a slight amount of air entering at the feed end of the mill. The fact that this system is a complete operating unit is advantageous, in that no outside equipment, such as conveyors or elevators, is necessary in contrast with that used in transporting material between two units of a two-stage operation. This elimination of equipment outside the mill and fan has reduced maintenance and repair costs to a minimum. A further important result is the continuity of operation which is obtained. The system is easy to operate, as all the adjustments except one are within reach of the operator on the ground floor.

In cases where it has been possible to follow the burning of the raw mix prepared by air classification, a distinct increase in the capacity of the kilns has been reported. This should be a natural result due to the practical elimination of tramp oversize, and the fact that chemical combination within the kiln is speeded up.

The dust laden atmosphere, which prevailed in most of the older dry-process plants, had much to do with the favoritism shown for the more cleanly wet-process raw mills. The unit reviewed in this paper is one which lends itself to a clean raw mill and one which is easily kept so, as the whole system is under a vacuum except the short length of air pipe between the fan and the mill. The application of the reversed current principle to the ball mill has enhanced the value of this efficient, slow speed machine for problems of dry grinding. The combined unit makes for low operating costs, because of the low maintenance and repair bills and low power consumption per ton of material handled.

Magnesite Mined and Sold in 1929

THE TOTAL QUANTITY of crude magnesite mined in the United States in 1929 was 187,660 short tons, with an approximate value of $1,500,000, according to reports furnished by producers to the United States Bureau of Mines, Department of Commerce. This represents the largest quantity mined since 1920 and was an increase of 47.5% over that reported in 1928, which was 127,200 short tons. There were four operators in California working four mines, one each in San Benito, Santa Clara, Stanislaus and Tulare counties, and one at Chewelah, Stevens county, Wash.

Sales of magnesite of domestic origin in 1929 were 11,390 short tons of caustic calcined (a decrease of 14.4% as compared with 1928) and 78,700 short tons of dead-burned (an increase of 73.9% as compared with 1928), having a total value of $1,947,860. No sales of crude magnesite were reported by producers in 1929, whereas sales of crude magnesite from domestic mines amounted to 620 short tons, valued at $5690 in 1928.

Throughout the year caustic calcined magnesite grade "A" (80% through 200-mesh) was quoted at $43 and grade "B" at $40 per short ton f.o.b. California mines. The price of crude was nominally $11. Dead-burned magnesite was quoted at $29 f.o.b. California mines and $22 to $24 per short ton f.o.b. Chewalah, Wash. These figures compare favorably with quotations in 1928. Producers reported a few sales of high-grade calcined magnesite as high as $45 per ton, but sales of the same material were made as low as $36. Most of the companies reported that the prices they received in 1929 were somewhat lower than those obtained in the previous year, but an increase in the proportion of high-quality material resulted in an increase in the average value of sales of caustic calcined magnesite in California to $35.94 in 1929, as compared with only $34.23 in 1928. The price of high-grade dead-burned magnesite as reported by the producing companies ranges from a minimum of $25 to a maximum of $48 per ton f.o.b. California mines, according to quality, the average being $36.80.

A little over 40 tons of brucite (magnesium hydrate) was produced and sold from a deposit in Nye county, Nevada.

Imports of crude magnesite in 1929, according to the Bureau of Foreign and Domestic Commerce, were 300 short tons crude, valued at $3179; 6500 short tons caustic calcined, valued at $145,874, and 46,382 short tons dead-burned, valued at $670,166.

Silica- and Semi-Silica-Walled Ovens

EXPERIMENTS to gain a comparison between silica- and semi-silica-walled coke ovens are described by E. C. Dixon in a recent issue of the *British Clayworker*. Mr. Dixon's observations show that silica-lined ovens, compared with semi-silica, can be coked in 10 to 20% less time because of their greater heat condition. The percentage of breeze is less in the shorter period of firing. The silica flues under the same conditions of firing generally get hotter than the fire-clay flues. A saving of 16% in gas is effected with the silica flues in comparison with the semi-silica.

Seattle Cement Products Producer Gets Big Contract

A CONTRACT involving several thousand dollars, providing for furnishing cast stone in the $600,000 Roosevelt hotel being built on the southwest corner of Seventh avenue and Pine street, Seattle, Wash., has been secured by the Olympian Stone Co., Leo Swartz, president, 6401 Seaview. This contract, it is said, is among the largest to have been let in Seattle for several months.

The Roosevelt hotel, planned by Architect John Graham, Dexter Horton building, is being built for the First Realty Hotel Corp., 19 stories, of fireproof construction.—*Seattle* (Wash.) *Journal of Commerce*.

Lime-Gypsum Plaster and Process for Producing

By Samuel G. McAnally

THE PROCESS for producing lime-gypsum plaster that will be described in the following paragraphs should be of interest to both the lime and the gypsum producers, as it has for its object a new process of manufacturing such plasters at a great economy of fuel, labor and time, producing gypsum-lime plasters superior to those heretofore used by the trade.

The methods of using this process have been incorporated in specifications in an application for a patent that is intended to cover the method and its modifications. However, the writer would be glad to receive comments on the process and trusts that the advances in technique that the process indicates will be of interest to both industries.

In the manufacture of calcined gypsum by the usual processes, the raw gypsum is heated in calciners to a temperature of about 350 deg. F. in order to partially dehydrate the gypsum and produce stucco. If the calcining temperature is raised to approximately 425 deg. F., the gypsum loses nearly all of its water of crystallization and a denser plaster is produced, which is used in the manufacture of casting and finishing plasters.

In the manufacture of hydrated lime by the usual processes, burned lime (CaO) is mixed with water, usually, in special types of lime-hydrating machines which have been devised to insure complete hydration of the lime.

Mixtures of calcined gypsum and hydrated lime are used in the building industry. The calcined gypsum is mixed with the hydrated lime, and the mixing is usually done on the job.

I have found that when lime (CaO) is mixed with hydrous materials such as gypsum, alums, borates, etc., a reaction takes place at comparatively low temperatures. The hydrates become dehydrated and the lime becomes hydrated. The reaction is exothermic and the heat evolved hastens the dehydration of the hydrous materials. The liberated water is absorbed by the lime to form hydrated lime.

The minimum temperature at which the reaction starts will depend on the temperature at which the hydrous material begins to lose its water. Gypsum begins to lose its combined water at 140 deg. F., and if a mixture of lime and gypsum is heated to 180 deg. F. the gypsum starts to give off water which is immediately absorbed by the lime to form hydrated lime. The reaction is accompanied by a rise in temperature which, if the mixture is correctly proportioned, will be sufficiently high to calcine the gypsum to plaster of paris. External heat is necessary only to warm the dry mixture to the temperature at which the reaction becomes sufficiently exothermic so that the heat evolved will complete the calcining-hydrating operation.

However, I have found that if the hydrous materials (gypsum, etc.) are mixed with sufficient moisture to hydrate a portion of the lime before mixing with the lime, or if the mixture of lime and hydrous materials are mixed with sufficient moisture to hydrate a portion of the lime, the exothermic (heat) reaction starts almost immediately and without the application of external heat; in a short period the reaction is complete with the formation of hydrated lime and calcined gypsum (if a lime-gypsum mixture was used).

Sufficient moisture to hydrate a portion of the lime may also be added through the medium of any materials which will hold a considerable quantity of uncombined water, e.g., diatomaceous earth, bentonite, dried clay, volcanic ash, fibrous materials, pulp, etc. Some of these materials will improve the strength or the plasticity of the lime and gypsum-lime plasters.

In practice, I do not limit myself to any stated proportion of lime and other materials. The proportions may be changed in order to produce plasters suitable for different purposes. If the plaster is to be used for the base or rough coat on walls, etc., I prefer to use a preponderence of gypsum. If the plaster is to be used for a smooth finishing coat, I prefer to use a preponderence of lime.

It will be evident from the foregoing that there are several methods of applying the process. A method of applying it to the manufacture of hardwall plaster would be to mix two parts of ground gypsum with one part of ground lime; while in agitation, the mixture is heated to about 180 deg. F. The reaction between the lime and the gypsum will manifest itself by a rapid rise in temperature as shown on the recording thermometer. When the temperature reaches a maximum and begins to decrease, the reaction is completed. The plaster is then conveyed to storage bins. The fiber or retarder or accelerator that is usually added to plaster may be mixed at any stage of the process. The lime and the gypsum may be heated before grinding or before mixing, in order to obtain the necessary initial temperature of the mixture; or the grinding, mixing and heating may be performed in one or more operations.

A method of applying the process to the manufacture of a finishing plaster would be to mix 9 parts of ground lime with 6 parts of ground gypsum, and to this mixture add 5 parts of diatomaceous earth containing 40% moisture. While in agitation, the mixture will become heated, and as soon as the temperature reaches a maximum and begins to fall the reaction is completed. The gypsum is dehydrated, the lime is hydrated and a very plastic and strong finishing plaster is produced, and requires the addition of only the usual retarder in order to regulate the setting time.

Using only pure lime and pure gypsum, approximately two parts of the latter and one part of the former react to produce plaster of paris and hydrated lime. If it is desired to increase the above proportion of gypsum, the mixture containing the increased quantity of gypsum should be heated to a correspondingly higher temperature or the lime may be mixed with the partially calcined gypsum.

Impure limes, including burned dolomite, requires less water for hydration and give off less heat than the pure limes. A mixture containing one part of raw gypsum and one part of burned dolomite treated by any of the suggested methods, preferably direct spraying with moisture, may be water or steam, would react to produce a very strong plaster.

The lime-gypsum plasters produced by my process are superior to those produced by merely mixing calcined gypsum with hydrated lime. The former are more uniform in composition, more plastic and stronger than the latter. Using my process, there is very little danger of "burning" the lime during hydration because most of the heat liberated during the hydration of the lime is absorbed by the gypsum or other ingredients. "Burning" the lime during hydration often happens in the usual processes. Hydrated lime alone has very little strength. The addition of gypsum plaster and other materials increases its strength very much. But it has been impractical and expensive to use mixtures of these materials except for special work. This proposed process opens a wider field for lime and lime-gypsum plasters, and my claims may be summarized as follows:

1. A process for hydrating lime which consists in mixing lime with one or more hydrates and heating the mixture until the

components start to react with each other.

2. A process of hydrating lime which consists in mixing lime with one or more hydrates and adding moisture to the mixture in such quantity as will raise the temperature of the mixture so as to promote a reaction between the component parts.

3. A process of hydrating lime which consists in mixing lime with one or more materials containing uncombined water.

4. A process of calcining gypsum which consists in mixing gypsum with lime and heating the mixture to approximately 200 deg. F.

5. A process of calcining gypsum which consists in mixing lime with gypsum at temperatures between 150 deg. F. and 250 deg. F.

6. A new process of calcining gypsum which consists in mixing gypsum with lime in excess and adding to the mixture sufficient moisture to combine with the excess lime.

7. A new process of calcining gypsum which consists in mixing moistened gypsum with lime.

8. A new process of calcining gypsum which consists in mixing gypsum with lime and one or more other materials containing uncombined water.

9. A new process of manufacturing gypsum-lime plasters which consists in mixing lime with gypsum and heating the mixture by any of the methods above described so as to promote a chemical reaction between the lime and gypsum in order to produce dehydrated gypsum and hydrated lime.

10. A new process of manufacturing calcined gypsum-hydrated lime plasters which consists in mixing lime with partially calcined gypsum during calcination.

11. A new process of manufacturing calcined gypsum-hydrated lime plasters which consists in mixing lime with partially dehydrated gypsum and heating the mixture so as to promote the necessary chemical reaction between the gypsum and the lime.

Discussion

It has been suggested that the removal of some of the water of crystallization from the gypsum by the lime is conceivable without being accounted for by the temperature, but tests have been made on mixtures of lime and gypsum which had been in contact with each other for about two weeks at normal temperature and got no reaction. Admittedly, lime has the greater affinity for water, but some heat is necessary to overcome the affinity of the gypsum for the water with which it is already combined. My experiments with gypsum prove that each succeeding fraction (half molecule) of the combined water is more difficult to liberate and requires more heat (not necessarily higher temperature) to liberate it than the preceding one.

However, the affinity of sulphuric acid (cold) for water is sufficient to dehydrate gypsum to plaster of Paris. The heat of solution of part of the gypsum in the acid may account for the reaction.

In the past some interesting facts on lime-gypsum plaster have been published and one of my specific claims really covers an improvement in the manufacture of calcined gypsum by the kettle process, i.e., it makes a stronger plaster with no additional expenditure for fuel. The increased strength is due not merely to the presence of the lime but also to the much higher temperature attained by adding lime to the partially dehydrated gypsum, which may even be single-boil material.

Unique Use of Colored Sand

HENRY FORD, the automobile manufacturer, will soon know why it is that Iowa has been such a fine market for the light cars turned out by his plants, thanks to the artistry of A. W. Van Cleave, well known local maker of sand art pictures, says the *Cedar Falls* (Iowa) *Record*, which continues:

Mr. Van Cleave, who for several years has been making remarkable pictures from colored sands found in the bluffs at McGregor, forwarded to the Detroit motor car manufacturer a magnificent picture of a typical Iowa farm scene labeled "Iowa where the Tall Corn Grows."

The picture shows a fine farmstead overlooking the beautiful Cedar river with a paved highway between the river and farm buildings. It is an autumn scene and adjacent to the farmstead is seen a field of corn in the shock with ripe pumpkins lying about near the shocks. In an adjacent field, a fine herd of milch cows grazing contentedly while occupying a prominent place in the foreground is a fine reproduction of a Ford sedan, seen spinning along the highway.

The picture is 16 by 22 in. and framed in a neat gilt frame and a real work of art. Mr. Van Cleave has fifty different shades of sand from which to make these pictures. He makes frequent trips to the McGregor region to replenish his supply.

Illinois Used Nearly a Million Tons of Agricultural Limestone in 1929

A NEW record of almost a million tons of limestone which Illinois farmers spread in 1929 to sweeten acid soils was enough to swell their crop returns by as much as 13 to 19 million dollars under the normal rate of expectancy, according to figures announced by C. M. Linsley, soils extension specialist of the College of Agriculture, University of Illinois.

Use of limestone and legumes for efficient crop production is one of the oldest teachings of the college. Last year farmers of the state spread a total of 950,000 tons in putting the plan into practice. This was an increase of 200,000 tons over the previous year and one of the biggest increases that has been made in the use of limestone in recent seasons. The figures include only the limestone sold in the state by commercial quarries. In addition a sizeable tonnage was put out by small local quarries.

Limestone, which costs around $2 a ton, can be expected to pay at the rate of $14 to $20 a ton in the form of bigger and more efficient crop yields, according to results which the experiment station of the college has secured on its soil experiment fields scattered over the state.

"Increased use of limestone during the past year shows that, in spite of hard times on the farm, farmers are scraping together the necessary funds for buying limestone," Mr. Linsley pointed out. "They realize that during a period of low prices it is more important than ever to produce high and economical yields if taxes, interest, labor and other expenses are to be met. They also realize that clovers are the cheapest means of improving their crop yields and that limestone must be applied to sour land before clovers can be grown. In many cases it is a question of liming the land and increasing yields or quitting the farm.

"Bankers would rather loan money to a farmer for limestone than for any other purpose because they know that limestone is a safe and profitable investment for sour land.

"Railroads, too, are behind the movement. One railroad last year delivered 76,000 tons, or 1,523 carloads, of limestone to Illinois farmers. This was an increase of 142 carloads over the previous year. Limestone trains which give the farmer the privilege of having his carload of limestone dumped on the right of way at a point nearest his farm have done much to encourage the use of limestone."—*Monmouth* (Ill.) *Review.*

Soil Reaction and Lime

NEUTRALIZING VALUES and rates of reaction with acid soils of different grades and kinds of liming materials are discussed by W. H. Pierre writing in *Soil Science*. He says that the rate of reaction of liming materials with acid soils increases with the H-ion concentration and the avidity of the soil acids. Fine liming materials neutralize soil acids more quickly than coarser ones.

Limestone, coarser than 20-mesh, is very slowly reactive, whereas material below 100-mesh in size usually shows its full neutralizing power in 1 to 3 months. Crushed oyster shells have about the same neutralizing value as ground limestone of similar grades of fineness.

The neutralizing value of ordinary basic slag as measured against boiling 0.4 *N* HCl is completely effective in neutralizing very acid soils, but somewhat less effective on medium acid ones. Ground limestone and crushed oyster shell coarser than 20-mesh neutralize some of the acidity developed by the use of $(NH_4)_2SO_4$ fertilizer, and are effective in maintaining yields of Austrian winter peas.

German Lime Engineer's Visit to American Lime Plants

(Continued from the May 11, 1929, issue of Rock Products)

Ourselves as Others See Us

IN DESCRIBING the plant and the development of the quarrying methods of the Peerless White Lime Co., near Ste. Genevieve, Mo., Horst Laeger, writing serially in *Tonindustrie-Zeitung,* in 1929, considers the new gas-fired shaft kilns very interesting. He reports that the kiln is drawn every four hours and refilled; that one is astonished about the hard work which is exerted in pushing the long red-hot rods through the many side openings. This widely used operating method in which sticking of the lime to the walls of the kiln is considered as a part of lime drawing, appears to be incompatible with the developments in modern kiln operation. He continues: "How much such a kiln could be helped by an efficient automatic discharge is so self-evident that only the absolute unacquaintance with more recent achievements can excuse this shortcoming. A surprise is also the feeding of the gas at two different levels. In fact, there is just as much half-burned material in the lime as in other firings, since no additional heat is received at the middle of the kiln."

The plant of the Marble Cliff Quarries Co., Columbus, Ohio, impressed Mr. Laeger especially because of its good management, due to which every rock in the quarry is being used where it is found to be most suitable. The utilization of all the crushed rock appears to him noteworthy and worth imitating. He considers the mortar-mixing plant very neat and appropriate.

In describing the two Schmatolla kilns of the plant of the Universal Gypsum and Lime Co. (the former Palmer Lime and Cement Co. plant), west of York, Penn., Mr. Laeger states that "the information concerning the output (70 tons daily at 20% coal consumption) appears too favorable for continued operation. Perhaps they count the one-ton discharge trucks which are frequently only half-filled." A great drawback to these kilns are the many difficulties which are due to frequent sticking. Furthermore, a large portion is not entirely burned; eight men, four on each side, pick cores continuously from the collecting conveyor, which are then burned again. Similarly as at Cedar Hollow, the Warner Co.'s plant, the discharge has been designed to preserve the lump lime.

A Back-Hand Compliment

In describing further the plant of the Warner Co., near Cedar Hollow, Mr. Laeger states that "it is interesting that over there (in America) experience leads to the conclusion that the Eldred process (of returning a part of the CO_2 exhaust gases of the kiln to the fire boxes) is desirable wherever the lime has a tendency to stick to the lining. It is difficult to see a reason for this, all the more because an overburning of the lime could not occur." . . . "The trucks are drawn by electric locomotives supplied with electric current from an overhead trolley as is done on street car lines—nevertheless, an odd picture in a lime plant." The visitor then states that "the American plants have as a rule well equipped laboratories," and then he continues that "the plant is not very impressive respective to its arrangement. As a small example it may be stated that many dangerous stairways must be used between and in the individual buildings, such as no industrial inspector would tolerate here (in Germany). But if one considers the diligence shown in working at the proper development of the plant and for the improvement of the products, then the plant deserves much consideration and is at any rate much better than it appears."

Horst Laeger considered himself lucky in arriving at the Union Furnace plant near Tyrone, Penn., of the American Lime and Stone Co., just in time to witness the great annual blast, in which at this time about 215,000 tons of very pure limestone was blasted; and he obtained several pictures of the event.

Concerning the equipment at the works of the American Cyanamid Co., in Canada, near Niagara Falls, Mr. Laeger writes that "the control equipment is interesting. (This plant was described in Rock Products, March 29, 1930—Editor.) All moving parts, feeds, conveying mediums, etc., are connected to green or red signal lamps. Thus one man is able to observe conveniently the entire kiln house. Amongst us (Germans) the most simple equipment for observing the bucket or spiral conveyors is frequently lacking, so that interruptions are recognized only then when their elimination has become especially difficult and burdensome."

In writing about the Berkeley plant of the North American Cement Co., Mr. Laeger states that "these kilns deserve mentioning because they were praised specially by Victor Azbe, and upon the basis of operating results were designated by him as the best in the United States. I was impressed with the suffocating dense smoke continually present at the gas producers, which could surely be eliminated, and also by the leaping of the bare flames from the quite leaky kiln doors, which disadvantage has, however, been observed elsewhere also. In fact, the output, the fuel consumption and the quality of the lime were all favorable, as compared with the customary American results."

On the Bellefonte Plant of the American Lime and Stone Company

A lengthy description is devoted to the Bellefonte plant of the American Lime and Stone Co. "The entire plant makes the impression throughout that it was not necessary to save money in its arrangement," writes Mr. Laeger, "yet much of it would be arranged differently by its operators today; most striking seems perhaps the separation of the two rotary kilns from each other by the loading track, which makes operation difficult and increases operating cost. The management seems to be typical; the director of the plant, Mr. Shallcross, is thinking of enlarging the kiln plant. The six old shaft kilns on the hill slope are to

Editor's Note

IT IS over a year since we published the first part of Mr. Laeger's report on his American lime-plant visits. Probably once a year is as often as we like to read criticism of our operations and industry.

Moreover, in reading this article, it should be borne in mind that Mr. Laeger, if we understood correctly, is not a lime manufacturer but the engineer of a lime-plant equipment manufacturer—a maker of automatic discharge shaft kilns, to be specific. Hence he undoubtedly views lime plants, and writes about them probably, from a slightly biased point of view.

Anyhow, his comments are interesting, for what they are, a foreigner's impressions of the American lime industry—with some concluding comments on our industrial system in general. Needless to say we do not necessarily subscribe to them, or even vouch for the entire accuracy of the translation. The most we can say is that this is a fair English rendering of his remarks originally published in German.—The Editor.

be shut down. Mr. Shallcross is entirely of the opinion that rotary kilns are too expensive and he would give preference to the mixed-feed, shaft kiln as the most favorable kiln from the standpoint of heat economy, if only there were usable mixed-feed kilns (fuel and stone fed into kiln and burned internally) of large capacity over there. It is very interesting also that other experienced engineers express this viewpoint. Over there they are very much under the impression that it is difficult to have gas kilns of great capacities and still maintain tolerable building and operating costs. This does not prove at all that the developments tend towards the mixed-feed kilns. The operators of large plants simply come occasionally to the conclusion that during seasons of low production and low sales prices the present day expensive plants eat up all the profits."

Horst Laeger finds the control board for the shipments installed in the manager's office of this plant quite suitable, and after describing its operation, states that "a curtain could be pulled down over the left column listing the brands of lime. Its purpose was explained to me as follows: Frequently there come to the plant representatives of competitors and visitors of the kind who are none too welcome; upon their approach the curtain drops. I thought there was nothing of that sort over there—but as one sees, people 'use water for boiling' everywhere. The curtain did not drop when I visited the plant—but even though it did not drop, I thank the gentlemen of that plant for their in-every-way amiable assistance shown in telling me about the individual operating results."

Besides the good safety provisions he found it also worth mentioning that there were here by way of exception a number of laborers' homes, which belonged to the plant. "They were built of wood and did not appear so very cheerful, the rent was $5 to $8 per month—but then that is very little."

Some General Conclusions

In concluding his series of articles on his trip to the lime plants in the United States, Horst Laeger makes a few general remarks. He states that generally the visitors are shown the social welfare arrangements when visiting various interesting rooms for employes, such as in warehouses, newspaper publishing houses, hotels, telephone exchanges, etc. "The Americans are anxious to show that everything of a 'social' nature can be done without any direction by law and without need of the culture of our old countries. . . . Over there they have no compulsory insurance of any kind. Instead, the Americans solve this problem aptly and practically in various ways"; and Mr. Laeger mentions the employes' insurance of the General Motors Co.; "this insurance is an exception, but much is now being done also on a small scale." (If Mr. Laeger's information on the lime industry was equally inaccurate, it will not prove very useful.—The Editor.)

"Safety committees take care of the elimination of the causes of accidents in the individual plants—membership in a safety committee is considered a distinction. In spite of this, frequently even the simplest contrivances for protection are lacking. A cement plant arranges for a 'no-accident' month. Over there June is the no-accident month. Pictures expressing great humor are hung on walls: Dr. X is on his trip to Atlantic City; no accident—no doctor. And on July 1 a flag is hoisted: No accident! Then appear new, humorous displays; what can be done in June, can also be done in July, etc. New and very impressive posters with good and striking pictures are sent weekly from the National Safety Council; the plant management subscribes to these pictures and hangs them up at a suitable place. Since they are replaced with others periodically, they are read. In one place I read: Your cut-off thumb does not grow again in a hundred years."

Impressed with American Democracy

"But much encouragement is given also through the plant's newspaper in which details even from private life are mentioned with humor, but in a friendly and good natured manner. This leads me to the last point which I would like to mention within the confines of this report. If one should ask me about my outstanding impression, then the following one is certainly one of them, namely: The common labor and the relation of the employer to the common laborer, which is not poisoned by any kind of slogans such as exploiting, and class war, or by any party doctrines. We (Germans) still stick far too much to the conception: Superior—subordinate. Over there (America) is much genuine comradeship; here frequently unfounded conceit.

"Surely, we find it much more difficult to change conditions which have been rooted during a long period. But we must educate or change the laborer to have an interest in technical progress and to engage aggressively in factory work—for the stage for this development has been reached long ago. No individual technical marvels of achievement or any bewildering simplifications seem to me to be necessary and usable, but we need the conception of co-operation or of co-working. One can do endlessly much here without expense.

"The laborer must recognize that guild and party concern him only in the secondary place, but that the welfare of the plant and of the country is his own welfare. Something has already been gained in this direction, for a short time ago a socialistic ministerial president spoke in this sense. On the other hand, over there it is self-apparent to the employer, that the well-being of his officials, and laborers in particular, yields him profits also. In our case the difficulties are immense indeed. The start must be made by the more educated ones. If we can succeed in gaining in this way the kind of leadership which the American employers and managers have, then we have taken over the best. Then in the ascent which is necessary and possible, and which is also becoming to the most insignificant ones, we will be all that the American is—Co-worker!"—*Tonindustrie-Zeitung* (1929) **53**, Nos. 31, 33, 37, 41, 43, 45, 50.

Lime on Lawns and Flower Gardens

BULLETIN No. 180 on the above subject has been published by the National Lime Association, Washington, D. C., as one of a series covering the various uses of lime.

Outlining the requirements for a good lawn, it follows with interesting information regarding lime and plant food. For overcoming soil acidity it recommends the application of from 50 to 100 lb. of hydrated lime per 1000 sq. ft. of surface, more being advisable in the case of heavy clayey soils than with sandy ones, in order to render them more lose and friable. It is stated that recent experiments have disproven the theory that acid soils are less tolerant to many weeds, and that results of experiments have shown that lawn grasses thrive best in a soil which is approximately neutral. Hence it is recommended that lawns be limed every three years, using about 50 lb. of hydrated lime per 1000 sq. ft. Liming should always be done at least a week before or after fertilizing, but never at the same time, as when they are applied together a chemical reaction takes place liberating considerable ammonia.

National Lime Association Issues "Lime in Concrete"

A BULLETIN on "Lime in Concrete" by C. E. Ellsworth, chief engineer of the construction division, has been published by the National Lime Association, Washington, D. C.

This bulletin brings out anew the long known fact that concrete must be water tight and impervious in order to be permanent, and that the addition of hydrated lime to the mix is the most effective way of obtaining this impermeability, which in many cases is even more important than strength alone.

The results of tests in various parts of the country and under various weather conditions are included, showing the gain in strength, workability and impermeability when lime is used as an admixture.

A formula is suggested as a guide in arriving at the proper amount of hydrated lime to add for any given mix, a coarse mix naturally requiring more lime than one with a greater proportion of fine aggregates. In the mixes covered by the tests the addition of hydrated lime in the amount of 8 to 10 lb. per sack of cement gave the highest strength and greatest impermeability along with the greatest workability.

Loading in the mine is done with an electrically-operated shovel with 1-yd. shallow dipper and the material is hauled to the primary crusher with 5-yd. side-dump trailers hauled by tractors

Gasoline Tractors and Trailers in Limestone Mine

Centropolis Crusher Co., Independence, Mo., Also Has Up-to-the-Minute Screening and Crushing Plant

By John M. Cox

AN UNUSUAL UNDERGROUND limestone mine is that of the Centropolis Crusher Co., about eight miles from Kansas City, Mo., near Independence, Mo. It was opened last year, but operations did not really get started until about April 1, 1930. Since then the property has been operated practically continuously, two 10-hour shifts per day, seven days a week, producing approximately 1200 tons per day.

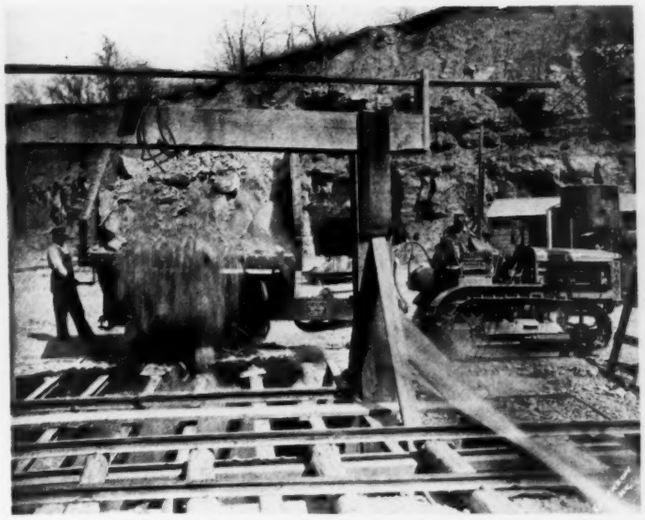
The mine has five portals or entries—the room and pillar system is used. The face is now about 300 ft. from the mouth and a working height of 16 ft. is carried. The rooms are 30 ft. in width and pillars of 25 ft. are left. The loading at the face is on about the same plane as the dumping level at the primary crusher, with no grade in hauling.

Drilling is done entirely by Model 11 "Waughammers," manufactured by Gardner-Denver Co. A top cut is first taken and then the bottom or bench is lifted. Holes are drilled to a depth of 16 ft. and Trojan 40% powder is used. Apparently the stone breaks easily and with considerable fines. Air is supplied to the drills at 80 lb. pressure by two 530 cu. ft. per min. Gardner-Denver air compressors—one belt-driven by a 100-hp., 900-r.p.m. motor, and the other by belt from a Kahlenberg Diesel engine. One of the compressors was installed in May and the intake is equipped with a Reed air filter. All motors throughout the operation are General Electric Co.'s.

Loading at the face is done by a Marion Type 450 electric revolving shovel, mounted on crawling traction trucks and equipped with a 12-ft. boom, 7-ft. 8½-in. dipper handle and a 1-cu. yd. shallow rock type dipper. It is equipped with a power-driven boom hoist. The hoisting, rotating and crowding operations are each controlled by an independent motor. These motors are 230-volt, direct-current mill type. A motor generator set is provided on the rear end of the machine, which consists of a 440-v., 40-hp. induction motor driving a variable voltage 25-kw., 250-v. generator. This generator supplies power for the various operating motors as well as the small air compressor used for operating the hoisting friction band.

The machine is equipped with a 1½-kw. electric light outfit consisting of transformer, wiring, conduit and four 60-watt lights and

Drilling and breaking is one step behind the shovel which moves continually from one end of the face to the other



Stone is hauled from the mine by tractor and trailer equipment and dumped into the primary crusher. The body is tipped by hydraulic hoist controlled from the driver's seat

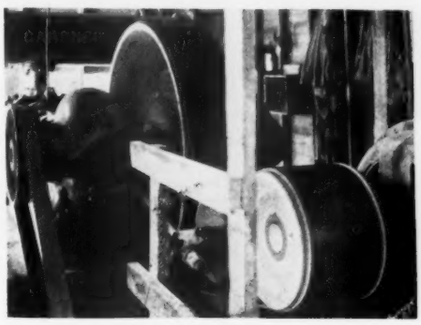
one 250-watt floodlight. The machine is designed to work in an underground quarry having a headroom of 15 ft. and a distance between supporting columns of 30 ft. A height of dump of 8 ft. is provided, with the shovel working in 15-ft. headroom.

The cab, or house, is made up of steel with a canopy type roof with open sides, with a total height above grade of 10 ft. 4 in. and a rear end clearance of 8 ft. 2 in.

Drilling and breaking is one step behind the shovel, so the shovel makes one long move from one end of the face to the other.

Unusual Haulage Methods

The method of hauling stone from the shovel to the primary crusher is an interesting departure from the conventional. The haulage equipment consists of two Athey trailers manufactured by the Athey Truss Wheel Co., equipped with Easton side-dump quarry bodies of 5-cu. yd. capacity. Dumping is accomplished by Commercial hydraulic hoists, controlled from the seat of the Caterpillar, wide-gage "Thirties," which are directly hitched to the trailers, the Caterpillar Thirty with the Athey trailer making one haulage unit.



Air compressor which maintains 80 lbs. at the drills

The management of the Centropolis Crusher Co. had studied the use of this equipment by contractors and deemed it adaptive for their haulage problem, and its performance and low cost have confirmed their judgment. The haul from the face to the crusher is about 500 ft. The two units in 20 hours' operation are delivering 1200 tons per day, or 50 trips per 10-hour day per unit, hauling an average of 6 tons. Gasoline consumption is about 80 gal. for the 20 hours for both tractors. Be-

The plant of the Centropolis Crusher Co., near Independence, Mo.

tween shifts the tractors and trailers haul fines to the dump, so are in use practically 24 hours per day. Direct charges for labor, fuel and oil approximate 3c per ton.

The Athey trailers dump directly to a No. 8 Allis-Chalmers gyratory crusher driven through a Link-Belt silent chain by a 150-hp. motor. All conveyors are Link-Belt, anti-friction rolls equipped with Timken bearings, and are driven through herringbone speed reducers and sprockets and link chain to accomplish the desired speed reduction.

The mill, while it is of conventional design, is noted for its simplicity and for the fact that anti-friction-bearing equipment predominates and that each machine has its individual motor, eliminating jack shafts. Its capacity is much in excess of the present output. The flow of material is briefly as follows:

Roller and Vibrating Screens Throughout

From the primary crusher stone is carried by a 30-in. conveyor to a Robins "Gyrex" scalping screen 42-in. by 108-in. Oversize from this screen is chuted to a No. 4 Telsmith reduction crusher and from there to a conveyor which returns the crushed oversize to the 30-in. conveyor ahead of the scalper.

Material which passes through the 2-in. scalper is delivered by conveyor to another Gyrex (double-deck) with 1¼-in. upper and ¾-in. lower screen, the 2-in. and 1¼-in. stone being chuted to separate bins.

Undersize from this screen is conveyed to a Robins "Vibrex" double-deck screen with ¾-in. screen on the upper deck and ½-in. below, the resulting ¾-in. and ½-in. stone going by chutes to storage bins.

The throughs from this screen are conveyed to a fines screen, a Vibrex single-deck with ⅛-in. mesh which produces a minus ¼-in. size, called "buckshot," and fines which

The gentleman wearing a straw hat is Charles Ross, general manager of the Centropolis Crusher Co., while the other is J. E. Campbell, superintendent

are hauled to a waste dump. These fines command some sale as agricultural limestone, are clean and a very superior agricultural stone, and the demand is increasing. Tyler "Ton-cap" screen cloth is used throughout.

The various commercial stone sizes are: 2-in., 1¼-in., ¾-in., ½-in., buckshot and fines in separate bins, from which they may be drawn on the one side for motor truck loading (a small item at this plant). Below the entire bin system is a conveyor in a tunnel fed by three chutes from each bin. This conveyor delivers to a cross conveyor leading to the railroad loading bins. Thus any desired size or mix can be delivered to railroad cars as the market requires. When loaded to cars the stone is given a final screening over a double-deck Robins Vibrex to remove dust. Due to the underground mining, the stone is remarkably clean, is well sized, and a rejected car is unknown.

MOTOR SCHEDULE

440-v., 60-cyc., 3-ph. Power comes in at 13,200 v. and is transformed to 440 v.

HP.	Speed	Drives
2	1800 r.p.m.	Buckshot screen
3	1800 r.p.m.	¾-in. screen
5	1200 r.p.m.	Conveyor from 1½-in. screen to ¾-in.
15	1200 r.p.m.	Conveyor scalper to 1½-in.
5	1200 r.p.m.	Scalper
25	1200 r.p.m.	Conveyor from primary crusher to scalper
5	1200 r.p.m.	Return conveyor from scalper
60	1200 r.p.m.	Telsmith crusher
150	600 r.p.m.	Allis-Chalmers crusher
5	900 r.p.m.	Pump
100	900 r.p.m.	Gardner-Denver compressor.
5	1800 r.p.m.	1½-in. screen
2	1800 r.p.m.	Loading screen

CONVEYOR SCHEDULE

Anti-friction, driven through herringbone speed reducers and link chain and sprockets.

	Width	Centers
A	30-in.	168 ft.
B	24-in.	82 ft.
C	24-in.	150 ft.
D	24-in.	60 ft.
E	24-in.	30 ft.
F (2)	24-in.	109 ft.

Development of an open-pit quarry within 1000 ft. of the primary crusher is at present under way. An Ingersoll-Rand portable compressor furnishes air for the drills here.

The output of the plant is marketed for state and county road work, building, and to Ready Mix Concrete Co., Kansas City, Mo. Nearly all shipments are via Kansas City Southern railway, which serves the plant.

Charles Ross is general manager of the Centropolis Crusher Co. and J. A. Campbell is superintendent.

New open pit quarry being developed at Centropolis

Aggregate for Black Top Roads

THE ENGINEERS CLUB of Philadelphia, Penn., in its monthly publication, *Engineers and Engineering*, devotes practically an entire issue to articles and discussions relative to asphalt pavements. One of the papers by A. T. Goldbeck, director, bureau of engineering, National Crushed Stone Association, outlines some of the theoretical and practical aspects of the design of foundations for black top pavements.

Considerable space is devoted to specifications for aggregate and sand in the city of Detroit, Mich. (Ed. Note.—This subject was covered in an article in ROCK PRODUCTS, May 24, 1930.)

Petroleum Coke Booklet

THE UNITED STATES Department of Commerce has published Economic Paper No. 9, written by E. D. Swanson, giving a survey of the production and uses of petroleum coke. The price is 10 cents, Superintendent of Documents at Washington, D. C.

Out-of-the-Ordinary 10-Inch Pump Sand and Gravel Dredge

Hugo Sand Co., Kent, Ohio, Has Interesting and Instructive Operation

By Bradley S. Carr*

THE HUGO SAND CO., Kent, Ohio, is using an electric powered, hydraulic pump dredge for the production of commercial sand and gravel aggregates. The equipment was commissioned early in 1929 and produced for the year's operating season a record output of materials, for the size of dredge employed. It is again at work for the 1930 season and is repeating the performance records established for the past year.

A 10-in. "Amsco," Type "H," heavy duty dredge pump with a full marine type, thrust bearing is used for the production of materials. The water end parts are all made of manganese steel, accurately machine finished where necessary to assure correct fit when replacements are required. The shell is of snail design, the side plates are provided with renewable liners, and the stuffing box has a large water seal chamber. The impeller is accurately balanced and attached to its shaft by tapered bore and auxiliary lock nut. It is directly connected to a 250-horsepower General-Electric, 40-C, slip-ring motor, of 505 r. p. m., full load speed, for electrical characteristics of 3-phase, 60-cycles, 440-volts; having controls providing for 50% speed reduction variation, continuous duty type. A No. 18 Francke full flexible coupling is used between the shafts of the pump and motor. The pump incorporates high efficiency hydraulic design features, giving high discharge pipe line pressure and maximum vacuum creative ability for suction pipe line. The pump and motor unit with its electrical controls provides extreme flexibility over a wide range of operating total head conditions. It is quickly responsive to the operator's demands and is a well synchronized installation as to characteristics of power and speed.

The hull pipe-line fittings, like the 45 deg. elbow with its handhole and cover plate next to the pump suction pipe line opening, the nipple next to the pump discharge pipe line opening, and the flap valve of enclosed design, are all of standard 10-in. Amsco design, made of manganese steel to insure maximum wear service.

Fig. 2 is an interior cabin view, showing a close-up view of the pump and motor unit, the picture being taken from the platform at about the operator's position. This view shows the dredge pump pipe lines hook-up at the pump position.

Fig. 3 is another interior cabin view from the front end of the boat, showing the hoist, the operator's position with centralized controls, together with a general perspective of the arrangement of auxiliary equipment appurtenances.

These two pictures emphasize the careful planning as to arrangement of equipment—compactness without cramped quarters, all with proper weight distribution; the trolley beam and hand hoist for handling dredge pump parts; the simple manner of water service piping details; that all electrical wiring is attended to with conduits, with ceiling mounting where convenient. Splendid lighting and ventilation have been provided for. Everything points to careful thought on the

*Manager, Pump Department of the American Manganese Steel Co., Chicago Heights, Ill.

Fig. 1. General boat design. Ladder in raised position

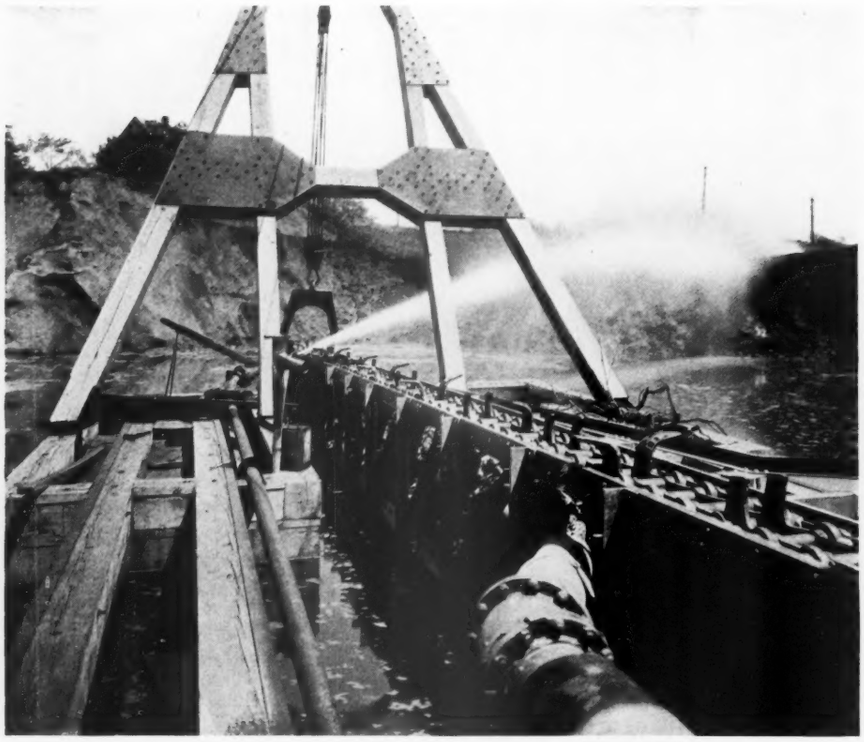


Fig. 4. The operator has complete control of the entire hydraulic installation

part of the builders to comply with soundest practice with economy for an objective.

Fig. 1 typifies the thoroughness of overall design and construction, coupled with exacting care shown to individual element details. The ladder in the raised horizontal position shows the extreme loading conditions for the dredge as a whole, in reference to its center of gravity, and it will be noted that the boat rides in splendid "trim ship" manner.

The general boat design incorporates safe features for use in a quiet inland body of water. No currents or heavy wave actions from winds are encountered. All construction is of wood, using dressed fir, of full length pieces. The hull proper is 40 ft. 4 in. long, by 19 ft. 6 in. wide, by 5 ft. 0 in. depth. The outrigger pontoons are 18 ft. 7 in. long, by 8 ft. 0 in. wide, by 5 ft. 0 in. depth; and are attached to the hull proper by heavy stringer timbers. The hull and pontoons sizes represent minimum practical dimensions for supporting this size of hydraulic equipment for the water conditions met with. Ample buoyancy and stability are provided with a minimum initial outlay.

The frames' details and their guy line rigging show proportion balance and proper distribution of loads met with. The foot plates of both frames are provided with pin connections to the boat, giving simplest strong construction coupled with flexibility.

The A frame is of special design, of heavy timbers, with joints made with steel gusset plates bolted in place. It acts as a truss yoke frame tying the pontoons together. For supporting the ladder bail loads, a heavy steel, bolted type, square-shaped yoke, attached to the cap block of the frame, carries the blocks' rigging. To effect the correct reeving of the hoisting line and dispense with any twisting of blocks and undue useless loads, the power line runs directly from the hoist drum on the hull to a lead sheave, which guides the line to a triple block at the ladder bail position from where it leads to a double-block mounted on the A frame head block. The arrangement, as shown, provides for a six-part line.

The gantry frame is of rectangular construction, amply cross-braced, and handles the guy lines from the A frame to the stern sides of the hull.

The ladder is a 10-in. pipe size, Eagle "Swintek" design, 50 ft. long, of heavy bridge-type structural steel construction. The traveling chain, driving sprocket and track liners are made of manganese steel to resist the abrasive actions of the deposit materials excavated. A 15-horsepower motor is used for driving the ladder through a silent-chain drive to the clutch of the ladder gear mechanism. The chain with openings of 6⅜ in. by 5½ in., permitting solids of this size to enter into the nozzle or suction pipe line mouthpiece, travels approximately 40 ft. per minute. Large, out-curved, digging arm attachments, together with vertical carrier attachments on the chain, give the ladder powerful digging ability and also provide for removing oversize pieces from the nozzle, thus permitting uninterrupted digging

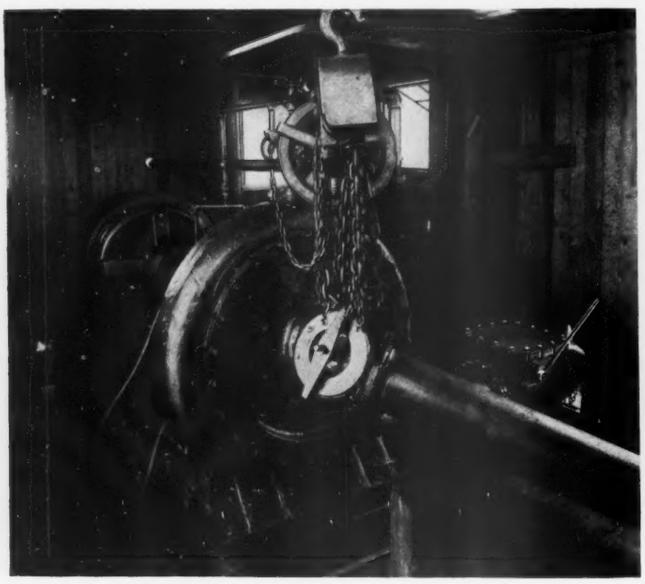


Fig. 2. Closeup view of pump and motor unit

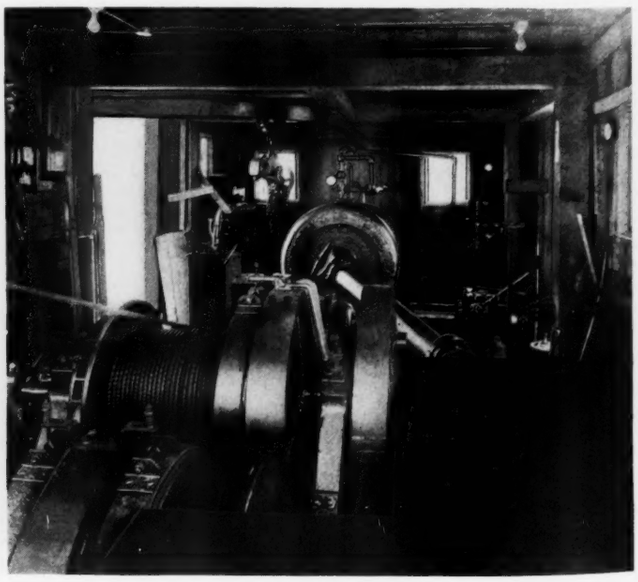


Fig. 3. Interior cabin view from front end of dredge

regardless of the nature of the deposit handled. The suction pipe line is a smooth, clean system from the ladder nozzle to the pump, giving greatest freedom to the flow of water and material mixtures pumped.

To aid in working certain types of deposit banks met with by sluicing, the dredge mounts an auxiliary high pressure water pump, electric motor powered. A pipe line conveys the water pumped to a monitor mounted on the left forward pontoon.

Fig. 4 shows a view of the ladder and forward pontoons, giving close-up details of the ladder construction, the traveling chain assembly, the monitor for sluicing in action and the nature of some of the deposit worked.

The dredge is capable of digging materials varying in maximum depth below pond water level from 40 to 45 ft. The vertical lift of the discharge pipe line has varied from 35 to 50 ft. with the discharge pipe line lengths varying from 200 to 800 ft. From the dredge to the shore point, the discharge pipe line is supported on pontoons which, in turn, carry the 3-wire power line system from the shore transformer station to the dredge.

The entire undertaking reflects a thoroughness of planning and attention to construction—a "fitness for purpose" atmosphere that emphasizes results. H. P. Bennett, president of this company, together with his plant men, attended to the construction of the dredge and the complete installation of all equipment.

The engineers of the pump department of the American Manganese Steel Co., working in conjunction with the Day and Maddock Co., Cleveland, Ohio, after a thorough and scientific hydraulic engineering survey of the property, co-operated with the owners in selecting equipment that would work the deposit most efficiently and attended to essential engineering construction details.

South Dakota State Cement Plant Said to Be Paying Debts

THE SOUTH DAKOTA state cement plant on June 27 turned over $150,000 to the state treasurer to apply on the plant's interest and sinking fund, George Philip, commission chairman, announced.

The cement plant commission met at the plant at Rapid City with the chairman, Secretary Nick Caspers, Rapid City, and Commissioner H. P. Gutzon, Selby, attending.

The payment is the first made this calendar year. Officials said they planned to make such payments in June and December. In the calendar year of 1929, $250,000 was forwarded to the treasurer, making a total of $750,000 since the first payment in June, 1926, plant officials said.

The cement plant was purchased with a $2,000,000 bond issue.—*Sioux Falls* (S. D.) *Argus Leader.*

Phosphate Rock in 1929

PHOSPHATE ROCK sold or used by producers in 1929 exceeded all previous records except for 1920, and amounted to 3,761,164 long tons, valued at $13,153,259, according to a statement by the United States Bureau of Mines, Department of Commerce, based on figures compiled from individual reports by the producers. Figures for Florida were collected in cooperation with the State Geological Survey. The quantity and value, by states, of the various kinds of phosphate rock sold or used by producers in 1929 were as follows:

	Long tons	Value
Florida: Hard rock	72,733	$267,218
Land pebble	3,015,874	9,633,856
	3,088,607	$9,901,074
Idaho: Western rock	35,899	141,931
Montana: Western rock	40	400
Tennessee: Brown and blue rock	633,939	3,097,104
Wyoming: Western rock	2,679	12,750
	3,761,164	$13,153,259

Florida held first place, as usual, and was the source of 82% of all the phosphate rock sold or used by producers in the United States in 1929, the same as in 1928. Land pebble rock constituted 98% of the Florida output in 1929, and showed an increase of 8% in quantity and 7% in value, as compared with 1928; the average value f. o. b. mines was $3.21 a long ton in 1929, as compared with $3.28 a ton in 1928. The hard rock production in 1929 decreased in both quantity and value as compared with 1928; the average value f. o. b. mines in 1929 was $3.67, as compared with $4.00 a long ton in 1928. The production of phosphate rock in Tennessee in 1929, consisting of brown and blue rock, showed an increase of about 10% in quantity, and about 8% in value, as compared with 1928. The production of brown rock constituted more than 90% of the total. The average value a long ton was $4.89, as compared with $4.95 in 1928. The quantity of phosphate rock sold or used by producers in the western states in 1929 decreased 5.5% as compared with 1928.

Although the total sales of phosphate rock by producers in 1929 increased 7% in quantity and 6% in value, as compared with 1928, there was continued decrease in production of Florida hard rock and continued decline in the domestic market for phosphate rock in the western states. The average selling value of all varieties was $3.50 f. o. b. mines as compared with $3.55 in 1928.

Imports in 1929, about 2% less than in 1928, amounted to 44,899 long tons, valued at $469,171. Exports were the largest of any year except 1903, being 1,142,746 long tons, valued at $5,386,919, according to the official records. Producers in Florida alone reported shipments during 1929 from the mines for export. These export shipments amounted to 1,110,325 long tons, consisting of 94% land pebble and 6% hard rock, which together constituted 36% of the total sales in Florida in 1929, and showed an increase of 25% as compared with 1928. The output of land pebble in Florida increased 8% in 1929 over 1928, and this increase was apparently all accounted for in the exports, as shipments of land pebble to domestic markets were less than in 1928. Total sales to domestic consumers, which comprised 64% of the Florida sales and all the sales of the other producing states, Idaho, Montana, Tennessee, and Wyoming, indicated a small increase in the quantity of phosphate rock consumed in the United States in 1929 as compared with 1928.

John E. Parry

JOHN E. PARRY, 72, secretary of the Glens Falls Portland Cement Co., Glens Falls, N. Y., was found dead in bed at his summer home on Twin Island, Bolton, July 2. An hour before, a relative went to Mr. Parry's room and found him sleeping soundly.

Heart trouble was the cause of Mr. Parry's death, according to Dr. Charles K. Burt, coroner, who was summoned after Dr. D. L. Rogers of Bolton arrived at the Parry summer home and pronounced Mr. Parry dead.

Mr. Parry's death follows less than two weeks after that of his wife, Mrs. Parry having succumbed suddenly on June 20. Surviving them are two sons, Edward H. Parry and John Elliot Parry, Jr., and four grandchildren, all children of the late Nathaniel Groesbeck Parry, who died several years ago.

Graduating from Union College in the class of 1880, Mr. Parry entered the Glens Falls National Bank. Mr. Parry assumed the position of cashier on November 3, 1906. He succeeded the late William A. Waite.

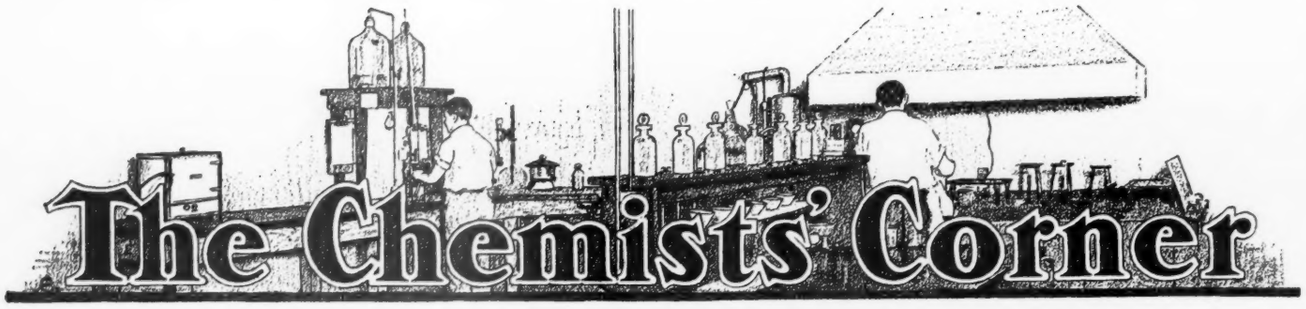
Upon the amalgamation of the Glens Falls National Bank with the Merchant's National Bank, Mr. Parry became vice-president of the institution. He completed half a century of service with the bank in April of last year. Mr. Parry had also been secretary of the Glens Falls Portland Cement Co. since its organization.—*Glens Falls* (N. Y.) *Post-Star.*

Wisconsin Lime Makers Ask University Assistance

THE WISCONSIN LIME MANUFACTURERS ASSOCIATION, because of the benefits derived by the clay manufacturers of the state from services rendered by the state university, has requested the same type of assistance from the department of metallurgy of the College of Engineering. The request was made through Prof. R. S. McCaffery, head of the department.

The lime manufacturers' organization has offered to supply funds for a fellowship to carry on research in the university dealing with problems of lime production in the state.

Ten of the producing lime plants have been visited in a preliminary survey of their problems. Tests have been made from kiln samples which enable the university experts to classify the 10 plants into three groups.—*Madison* (Wis.) *Journal.*



Perchloric Acid Method of Silica Analysis—Its Advantages Over Double Evaporation

By Wallace K. Gibson

Assistant Chemist, Trinity Portland Cement Co., Dallas, Tex., formerly with the American Smelting & Refining Co., Leadville, Colo.

THE METHODS of silica analysis of cement embrace the requirement of double evaporation in order to extract the last traces possible of silica. Such routine procedure requires much time, and errors are made due to the accumulation of traces of impurities in distilled water itself, which, of necessity, are added after the second evaporation has been made.

Upon the filter paper containing the residue from second evaporation, reddish color has been frequently noticed, which evidently has been that of iron oxide, together with alumina. Comparative analyses of a cement and a clinker showed that single evaporation of silica analysis brought out results closely checking with true silica extracted from the insoluble residue obtained by double evaporation by means of evaporating with hydrofluoric acid. Without checking for accuracy by means of using hydrofluoric acid, the double evaporation of silica brings out errors as high as 0.30% to 0.85% SiO_2, while single evaporation of silica gives results which check closely with true silica obtained by evaporation with hydrofluoric acid. Therefore, apparently, for daily routine analysis, double evaporation is not absolutely necessary. An interesting investigation by Dr. W. F. Hillebrand, which corroborated Alex Cameron's findings explained in the *Chemical News* can be found in Richard K. Meade's "Portland Cement," page 445, 3rd edition.

The perchloric acid method eliminates all the disadvantages of the length of time that has usually been spent on double evaporation of silica, and further baking of dry residue; it also eliminates further accumulation of errors. The operation is more simple and convenient than the old method. The perchloric acid method takes but from 30 to 45 minutes, depending on how much water is added to the solution.

Caution, however, is to be given to avoid boiling the solution after water has been added to the concentrated mass before filtering silica. Before the solution will boil, a violent explosion will occur, spreading a spray of dangerous hot liquid in all directions. The author was fortunate to be in a position far away from the hot plate when several explosions have occurred. Chemists need not be afraid to use perchloric acid, because its use is just as safe as sulphuric acid when precautions are taken. Anyhow, it is of no advantage to bring the solution of silica to boiling after diluting it before filtering off silica. Chemists preferring to boil the silica after completing the required evaporation can do so, provided that they dilute the concentrated solution to about 150 cc., so the solution can boil freely; whereas, insufficient water in a gelatinous mass of silica will cause a possible explosion. The point is to be made clear that the initial evaporation of 10 cc. of $HClO_4$ with about 5-10 cc. of H_2O does not occur that way, because the gelatinous silica becomes a mass while evaporating and fuming.

Procedure of Analysis—For Cement

Weigh out 0.5-gram sample of cement, using a tall 200-cc. beaker. Moisten the sample with a jet of water, add 10 cc. 72% perchloric acid ($HClO_4$). If preferred, full concentration of the acid without moistening with water could be used. Break up lumps before placing on hot plate. Allow the solution to evaporate off in a state of slow bubbling until heavy white fumes of the acid appear, then remove glass angles or "riders" from under the watch glass. Boil gently without spattering for 15 minutes, allowing the fuming to continue, but keeping the fumes confined inside the beaker. Cool, dilute with a jet of hot water, stirring until a condition of easily moving liquid, which would be about 20 to 40 cc. Filter off silica, wash with very dilute hot HCl (10%) three times.

It will be necessary to add 5 cc. HCl to oxidize the filtrate for iron and alumina extraction. Either bromine water or a few drops of nitric acid will do.

For Limestone or Raw Mix

Sinter 0.5-gram sample with 0.5 gram sodium carbonate containing 2% KNO_3. Dissolve the fused mass in dilute hydrochloric acid; when all is dissolved the crucible is removed; then add 8 to 10 cc. perchloric acid. Allow the solution to evaporate until heavy fumes of perchloric acid appear; proceed as in cement.

The silica should be washed with hot dilute HCl until the greenish solution of ferrous perchlorate in the silica on the filter disappears completely. According to the table of solubilities, ferrous perchlorate is more readily soluble in water than ferric chloride, giving the reason for much less retention of iron and alumina in silica; at the same time retaining more silica in the filter than by any other method. The accompanying table shows how much impurities the percholic acid method yields compared with single and double evaporations.

ANALYSES OF HIGH SILICA CLINKERS

	Double evaporation using hydrochloric acid		Perchloric acid method
Original weight SiO_2	23.16	23.24	22.80
HF. loss—true SiO_2	22.54	22.54	22.72
R_2O_3 retained	0.62	0.70	0.08
Original weight R_2O_3	8.42	8.46	8.70
Recovered SiO_2	n.d.	0.08	0.14
Corrected SiO_2	.....	22.62	22.86
Corrected R_2O_3	.....	9.16	8.78
Double evaporation without correction			23.20
Single evaporation without correction using hydrochloric acid			22.58
Difference			0.62%

Note that single evaporation of cement analysis checks closely with true SiO_2 of double evaporation.

STRAIGHT DOUBLE EVAPORATION USING HCl

SiO_2	22.86	22.74
R_2O_3	8.54	8.90

These were doubly evaporated in same casserole without filtering off SiO_2.

From the above results, it seems that more impurities have been picked up during the subsequent operation of evaporating the silica filtrate and filtering. Then the second filter paper used adds its traces of ash to the first, giving doube ash weights, all of which gives appreciable errors in the final results. In making corrections with hydrofluoric acid, the outcome is that SiO_2 is less than it should be and R_2O_3 more than it should be. Without corrections with hydrofluoric acid, the silica percentage is too high.

ANALYSES OF OTHER CEMENTS

	—1—		—2—		—3—
	C	B	A	B	B
Original weight SiO_2	23.30	22.94	19.42	19.56	19.24
R_2O_3 retained	0.36	0.24	0.10	0.14	0.16
Original weight R_2O_3	9.00	9.36	11.28	11.16	11.16
Recovered SiO_2	nil	0.24	0.10	nil	0.04
Corrected SiO_2	22.94	22.94	19.42	19.42	19.28
Corrected R_2O_3	9.36	9.36	11.28	11.30	11.28

Cement No. 1—Analysis furnished by Houston Trinity chemist. SiO_2 in R_2O_3 was extracted by fusing R_2O_3 with $NaHSO_4$.
Cements Nos. 2 and 3—Analyzed by the author.
Analysis A—By single evaporation.
Analysis B—By the perchloric acid method.
Analysis C—Double evaporation.

The initial cost of perchloric acid is greater than that of hydrochloric acid, but this added cost is eventually counterbalanced by the saving in fuel used to bake the residue for one hour. Where a sample of cement is to be analyzed in a rush, the perchloric acid method is superior to the use of hydrochloric acid even by single evaporation. The silica is colorless and traces of ferrous perchlorate are plainly seen while washing with hot dilute hydrochloric acid; it takes about five washings to eliminate the greenish coloration in silica.

Perchloric acid is a powerful dehydrating agent, it boils at 203 deg. C. F. G. Hawley* reveals that a minus error in silica analysis has been due to the solubility of SiO_2 in hydrochloric acid, and that the amount of silica dissolved is proportional to the amount of silica in the sample. In trying to analyze silica in shale and flint sand by the perchloric acid method, it has not been possible to wash all the alkalies used in fusing the samples; nevertheless, to prove the dehydrating power of the perchloric acid, by evaporating R_2O_3 residue by means of hydrofluoric acid to detect silica, 50% silica in shale left only one-tenth of 1% in R_2O_3; none in the filtrate of 92% silica in flint sand. Time could be cut short in the analysis of shale, clay and sand by adding 10 cc. of perchloric acid to the filtrate and slowly boiling until dense fumes are given off as in cement analysis instead of evaporating to dryness and baking, thus assuring complete extraction of silica.

Engineering and Mining Journal, March 31, 1917; also Leafax Index. References: *The Jour. of the Am. Chem. Soc.*, vol. 42, No. 11. Nov., 1920—"Perchloric Acid as Dehydrating Agent in Determination of Silica," by H. H. Willard and W. E. Cake; "Portland Cement," R. K. Meade.

New Chemical Dictionary

A REVISED and enlarged, 550-page, second edition of "The Condensed Chemical Dictionary" has recently been brought out by the Chemical Catalog Co., Inc., New York, publishers of the Chemical Engineering Catalog.

This dictionary brings together into one volume a large amount of useful information on chemicals and chemical products, particularly those of commercial importance. It is arranged in a straight alphabetical classification, and under each product there is given, in addition to the definition, information on the properties and constants, derivation, various grades, usual containers, uses, railroad shipping regulations, etc. Important trade and proprietary names have also been included.

At the end of the book have been included 60 pages of the more important tables, such as weights and measures, metric equivalents, equivalent temperatures, specific gravity equivalents and tables, freezing mixtures, thermal resistivities, etc., along with definitions of units.

Considering the amount of general information of various kinds contained in the book and the ease with which it may be found, it should be very useful to both the non-technical person interested in things chemical, as well as to the chemist.

Extraction of Potash from Texas Polyhalite

A DETAILED STUDY of the properties of Texas polyhalite with the possible application of these in the industrial extraction of potash in view, has been conducted during the past two years by the Nonmetallic Minerals Experiment Station of the United States Bureau of Mines, Department of Commerce, at Rutgers University, New Brunswick, N. J. Some of the results of these investigations have appeared in Bureau of Mines Bulletin 316, and further data will be published in the near future as Reports of Investigations.

Two processes have been developed, one of which produces potassium sulphate and the other both potassium sulphate and a double salt containing magnesium and potassium sulphates. Preliminary cost estimates show that the average cost of producing 90% potassium sulphate by either of these processes will be $16 per ton at the plant, and the cost of producing the double sulphate of potash-magnesia will be $8 per ton at the plant. If a reasonable freight rate to seaboard can be obtained, it is probable that potash from Texas polyhalite can successfully compete with the imported products.

Further investigations have been made on the extraction of calcined and uncalcined polyhalite with saturated salt solutions, and the data thus far obtained show that it will probably be possible to develop an industrial process for the manufacture of muriate of potash from Texas polyhalite.

Results have also been obtained concerning the rate of decomposition of polyhalite by water at atmospheric temperatures using varying ratios of polyhalite to water. These data show that the use of finely ground polyhalite per se as a fertilizer is possible, the rate of decomposition being rapid enough to dissolve all of the potash in a few days assuming a temporate climate where a ratio of 6 parts of water to one of polyhalite is feasible.

Canadian Report on Ore Dressing

THE DEPARTMENT OF MINES, Mines branch, Ottawa, has published a pamphlet, "Investigations on Ore Dressing and Metallurgy," No. 711, which is a report of tests conducted during 1928 pertaining to both metallic and nonmetallic technical problems. Section III of this 166-page report contains the result of investigations on graphite concentration from low-grade ores; asbestos-bearing rock investigations; grinding of soapstone; grinding of calcite from lead mines; concentration of garnet ores; washing of china clays, and a chapter on the preparation of oyster shell poultry feed. Other chapters deal with reports of interest to the metal mining industry.

In connection with the reports on the treatment of graphite ores considerable space is devoted to results of tests where the oil flotation process and tabling was used on that type of ore. Several flow sheets and other data are included.

The chapter on the concentration of flake graphite is by C. S Parsons and R. K. Carnochan and the other chapters on nonmetallic investigations are by R. K. Carnochan and R. A. Rogers.

Hints and Helps for Superintendents

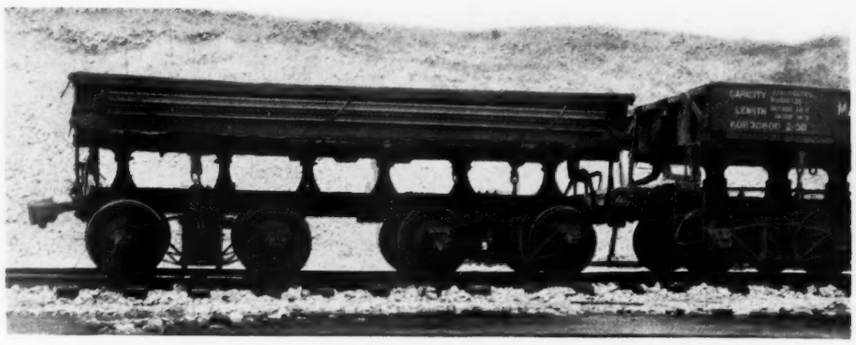
Dumping Gravel Cars

IN the Chicago area a large gravel producer found that the transportation from the pit to the plant was the bottle neck of the operation and so decided to speed up that phase of his operation and take advantage of every moment involved in connection with haulage.

One of the many things he did to save minutes was to provide dumping facilities at the primary crusher of a nature that the gravel train did not have to stop each time a car was dumped. First the rail farthest back from the primary crusher pit was raised several inches so that the body of the car sloped towards the crusher. Then by releasing the chain hooks the loads dumped themselves, after which it becomes necessary to return the car to its original loading position.

As the car is pushed farther past the pit, the track becomes practically level again which tends to return the car body to its original position. Steel rails have been clamped to the high side of the empty car to assist in this regard.

The train of seven or eight, 12-cu. yd. cars can now be dumped in about 20 to 30 seconds at the Material Service Corp. plant near Lockport, Ill.



The cars are counterbalanced with steel rails to return the bodies to the loading position

Electric Welder on Rails

THE BIRDSBORO (Penn.) quarries of the J. T. Dyer Quarry Co. could be said to consist of three separate operations: The quarry, plant and stockpiles, the latter being about two miles from the plant. In the event that there is a hurried need for a weld at any of the three locations, the electric welder, illustrated in the accompanying view, can be dispatched at once over standard gage rails to a convenient location near the job.

The electric welder can be sent to the plant or to the loading yard

Safety Device on Gasoline Locomotives Prevents Broken Castings

By C. H. WRIGHT
Master Mechanic, Snyder, N. Y.

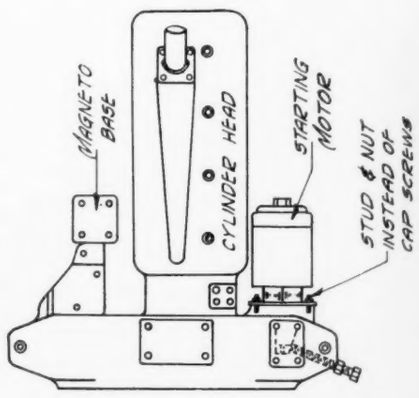
I HAVE made a simple device to avoid expensive delays in the quarry transportation system at an operation using four 6-ton gasoline locomotives, each hauling five cars.

Just suppose a locomotive and five cars entering the pit at the mill, and for some reason or other the engine stalls on the down grade. The locomotive operator steps on the starter button and the starter housing breaks, which has often happened. What is the result? Another locomotive comes in behind with five loaded cars, the broken-down engine is on a down grade in the pit and can not be moved back easily so that engine can be started with the crank. It just simply means that by man power or some other device, the locomotive has to be forced up grade to a place where it can be repaired and operations continue.

Or another condition may exist, a locomotive with five cars goes to the leading shovel and another similar train to the shovel taking the second cut. Something happens to the starter motor on the locomotive at the first shovel. It's possible that the locomotive working from the shovel taking the second cut can not push this disabled locomotive and five cars and with its own five cars loaded up all the grades which most always exist in a quarry. So all cars must go to the mill empty, and the locomotive put on the siding for repairs. This causes a delay in production.

Some may think that this repair could be made at the shovel, but that loss, taking into consideration the delay of the shovels and the mill crew, when figured up, would amount to a much larger sum than losing ten small car loads of stone. Oh, you say, that was not much of a delay. No, I admit, but you stop and figure up all these little delays at the end of a day's work, your wages and my wages, and we can find considerable to be saved.

I have drawn up for you, so you will easily grasp the idea and the location, the plan of a set screw that will support the inserted end of the motor starter housing. All that is required is a 5/8-in. set screw with a lock nut next to the casting to keep the set screw from working away from the casting after it has been properly set.



Safety device for use on gasoline locomotives

Before installing the motor remove the small plate over the inserted end of motor, so that clear access may be had in getting the set screw properly set after motor is in position.

Before you put in that set screw, put on the eye protectors and grind off the cup end of the set screw so that it won't have a tendency to dig into the casting and cause it to break.

After one such set screw was installed early last spring, we ran the whole season without breaking a casting. This applies only to our 6-ton locomotives.

Just one other thing to put into effect and it will be much easier for one man alone to install, and it is just this: Instead of using cap screws to hold those motors on the engine frame, make some stud bolts and use a hexagonal finished nut. We tried it and found it quicker and easier for any one person to install the motors. And we were not wearing out the thread in the casting, screwing those cap screws in and out whenever a motor was changed. Again you know quite often there are men who can not put in those cap screws without getting them cross threaded. That of course causes a lot of extra work and time lost that could be put to better advantage.

Non-Slip Construction for Hand Trucks

THE UNIVERSAL Atlas Cement Co., Buffington, Ind., provides hand trucks of the design shown in the accompanying illustration, according to the *National Safety News*. They are of metal construction but so balanced as to make them easy to handle. The outstanding feature is the shape of the casting at the base of the truck which, when the truck is tipped to take on a load, rests on the floor and prevents it being pushed back on to the feet of the operator by the load.

Hand trucks of metal construction used at cement plant

Cable Reels

FROM TIME TO TIME we have published hints and helps on the use of reels for handling electric cables in connection with electric shovel operations. These reels are highly advisable and satisfactory if a *well insulated cable* is used, but a poor cable is said, when kept in a coiled position, to give a serious increase in power consumption.

Incline Track Layouts

A QUADRUPLE TRACK layout for an incline to a crushing plant is unusual and if one had to vision and build such an installation, the accompanying illustration showing how it was done at the Greencastle, Ind., plant of the Mid-West Crushed Stone Co., may prove helpful.

A four-track incline at the plant of the Mid-West Crushed Stone Co.

Speeding Up Transportation

AT A PLANT near Chicago, Ill., a signaling device was installed so that the locomotive engineer could be kept informed at all times what was expected of him when the gravel cars were being dumped. This was done by having a series of electric lights actuated by a simple switch that could be thrown on or off by one of the three long horizontal bars shown in the illustration. The man in charge of the dumping, without leaving his post, could reach over, push one of these long bars and turn on or off any of the three lights. The engineer of the gravel train then could govern himself accordingly.

The long bars operate the light signals without the operator having to move from his post

Flag Stones

BEFORE CONCRETE was the accepted material that it now is for walkways, flag stone walks were common. Quarries received a high price for flat, irregular slabby stone for use in this manner. The fact that flag stones are a means of artistic expression is returning them to their earlier uses and we find many small quarries getting out these stones that are being used in some such manner as in the illustration.

Artistic Colonial walk of flag stones

Editorial Comment

Business Poker

We know business men who judge the business ability of their contemporaries by their skill or ability in the great American game of Poker. They say a good business man is a good poker player. There is no denying that a great many business men like to play poker, and that it is a business kind of a game. And the same business men who play poker well are apt to get "a kick" out of business that is wholly aside from their business profits or income.

We once referred to business in these columns as "a game" and said that to red-blooded business men business was more than a means of livelihood. They spend their lives at it because they get enjoyment out of business fully as much as for the profits in it. While nearly every business man looks forward to a "farm and retirement," few do retire, largely because the game is too interesting and beguiling to leave it.

Not long since one of the elite business magazines had a long article or editorial about the harm done in referring to business as a game. Oh no, it was a science. But that was before the stock market crash of last fall. It would probably be better all around if business were a science, but a way must be found to make it interesting to good poker players, for their number is legion.

For a long time we have thought about over-production, or more properly speaking, over-capacity to produce, and wondered why new plants are continually built when the facts in regard to production and consumption are fully known and no doubt fully appreciated. For example, consider the portland cement industry. Capacity just about doubled between 1910 and 1930. Consumption of portland cement has never been much nearer than 80% of capacity on a yearly basis. Yet in the face of widely known statistics which proved this, every year new capacity was added to the industry both through the addition of new plants and by rebuilding, improving and adding storage capacity to the older mills.

Who added all this new capacity to the cement industry? Some cement manufacturers would have us believe newcomers in the industry are responsible. The fact is that an analysis of these additional plants and plant enlargements shows that nearly 70% of the increased capacity of the portland cement industry between 1910 and 1930 came from concerns already in the industry, and only about 30% from newcomers.

Why did portland cement manufacturers, fully aware of conditions, or statistics in regard to production and consumption—and full knowledge of probable or possible consumption—continue to increase the capacities of their plants? Of course, there were many logical reasons such as greater utilization of their plants, equipment and resources, the possibility of making better cement and cheaper cement in improved and newer plants, the natural and universal American desire to grow and expand, and perhaps the entirely normal human trait that always exempts one's self from all the rules and regulations of economics and business generally.

But we believe another reason equally strong has been a factor. That is the love of the great American game of business—poker. With the insatiable ambition to grow and expand few American manufacturers are content with their present market or their present operations. They are ever alive to the possibilities of other markets and other operations. A manufacturer focuses his attention on a suitable site for a plant—to be built "when the time is ripe." Others are doing the same thing. One day he wakes up to the fact that a new plant is being projected in *his* present or prospective market territory. Forthwith he rushes in to build his new mill first—not so much because he is really optimistic in believing that the mill is actually needed, as because of the perfectly human desire to keep the other fellow out.

Then, too, there is plenty of evidence of retaliation in business. It looks, at least, as if many a business man often puts aside his better or his saner judgment to "get even" with a competitor who has obtained an advantage over him, or to forestall one who is about to obtain an advantage, or who he thinks is about to obtain an advantage. And last but not least of the influences which lead to the building of new plants, bearing in mind the resemblance of business to poker, is "bluffing" and "showdowns." May it not be quite possible that some plants have been added to the fold because pride, or the technique of the game, requires sometimes that a threat or a bluff be fulfilled?

Most assuredly, we are not opposed to the building of new plants or to the rehabilitation of old ones. Any industry would soon become stagnant without a liberal policy of new development. Each new plant generally is, and always should be, an improvement in one or more ways over an existing plant. Then there is the element of obsolescence which must always be considered; and if a producer has neither the judgment nor the capital to keep his plant in the running, justice to those who have and to the public requires it be forced out of the running rather than be protected into perpetuity.

Unlike some others, the portland cement industry has had little opportunity to let its mills become obsolete, because the machinery and equipment wear out in a few years anyhow, and must be replaced. Nevertheless, the strides made in labor-saving in the newer mills through better design and larger machinery have made some of the older ones obsolete under present and prospective selling prices of cement. For one, we doubt if some of the present alleged clinker capacity of about 250,000,000 bbl. a year ever will be used. Probably an appreciable part of it is in mills that have become obsolete in the last two or

three years, in spite of comparatively recent large expenditures for replacements and improvements.

The only point we would like to make is that there really should be more *science and less poker* in business, for we believe the cement industry that we have used as an example is no different from the others in this respect. We would be the last ones to remove the joys of doing business, but we do think that there is just as much opportunity to enjoy business—for personal triumph if that be a cause for joy—in doing business in a more intelligent, scientific, impersonal and enlightened way, and in a way less costly to stockholders and to the industry as a whole.

Large Gypsum Crystals Found on Plains

GYPSUM CRYSTALS, usually little more than an inch in length, have recently been discovered on the large salt plain near Cherokee, Okla., according to Dr. Charles N. Gould, director of the Oklahoma geological survey. These crystals were found by Dr. Ralph D. Bird of the University of Oklahoma, during the time he was working with the Oklahoma geological survey in the vicinity of the salt plain.

Several specimens were collected and sent to the geological survey for identification. Prof. C. A. Merritt, who examined them, stated that the crystals were of gypsum, but were of an unusual type in that many of them were in the form known as penetration twins, or two or more crystals formed together.—*Oklahoma City Oklahoman.*

Gravel Replacement Requirements for Minnesota Roads

MORE THAN A HALF MILLION DOLLARS will be spent for regraveling unpaved routes in the Minnesota trunk highway system this summer, according to C. M. Babcock, commissioner of highways. To June 25, thirty-five graveling contracts have been let by the maintenance division, covering 399 miles of highways at a cost of $226,636. These represent only seven of the sixteen maintenance districts. When contracts have been let in all the districts, the figure is expected to go well over $500,000. Last year the total spent for maintenance graveling was $551,778.42.

These figures do not include contracts for graveling new routes, let by the construction division, nor do they include patch graveling done by the maintenance section men. Every section man has either a truck or team, and does a great deal of graveling on short stretches, filling frost boils and other muddy spots, throughout the season. Where the gravel is worn out over several miles on any route, regraveling is done by special contract, paid from maintenance funds.

"Patch graveling takes care of special conditions on short stretches. The contract regraveling is replacement of part of the gravel worn away by traffic," Mr. Babcock points out. "During every prolonged wet period a great deal of gravel sinks into the sub-grade. During periods of drowth a lot of gravel is picked up by the passing wheels, and thrown or blown off the roadway. But even with favoring weather, the loss of gravel goes on the year around. In winter when there is little or no snow on the ground, the loss of gravel is considerable.

"Gravel wear varies according to traffic. On some of the more heavily traveled routes regraveling is necessary every second or third year, while on routes with less traffic a longer wait may be possible. Where traffic is very heavy, and where pavement cannot be built at once, we are using bituminous treatment as a means of saving gravel. But with the paving and bituminous work we are doing this year, we will still have more than 4,000 miles of untreated gravel highway where the gravel surface will need frequent renewal.

"Although Minnesota has more than most states, we have already exhausted the local pits along many routes, making longer and more expensive hauls necessary. Using up local gravel on the trunk highways is also making it more difficult and expensive for the counties and townships to get gravel for their local roads."—*Sauk Centre* (Minn.) *Herald.*

Effect of Fluorspar on Physical Properties of Lime-Silica Slags

EXPERIMENTS on the viscosity of calcium silicate slags have been in progress for the past three years by the Metallurgical Section of the Pittsburgh Experiment Station of the United States Bureau of Mines, in co-operation with Carnegie Institute of Technology and the Metallurgical Advisory Board. The viscosity relations in this system have shown a minimum viscosity at a composition of approximately 51.5% CaO and 48.5% silica. When fluorspar is added to lime-silica slags, little thinning takes place until about 2% fluorspar is added, when the viscosity drops markedly, as does the melting point.

A series of melting tests on slags in the system lime-silica-fluorspar has shown that some of the slags in this ternary system possess rather remarkable physical properties. A definite range of low-temperature decomposition has been found, and some of the ternary slags melt at temperatures not exceeding 1000 deg. C. Of particular interest is the physical appearance of some of the slags in this system, which resemble a high-grade tile.

South Dakota Quarry Resumes Operation

THE WEST QUARRY, Dell Rapids, S. D., owned by the Superior Construction Co., Chicago, Ill., started up recently and is now working 15 or 20 men. Last fall 16 holes were drilled in the rock in the quarry, each hole holding from 600 to 700 lb. of dynamite. One of these blasts was discharged recently.

K. E. Casparis, formerly of Columbus, Ohio, but more recently of Winnipeg, Man., is the new manager. Mr. Casparis is not entirely a stranger here, as he installed the plant in 1915, being here during the months of January, February and March.

At present the quarry has only a small order, but some large contracts are expected in the near future. There are fifteen holes loaded with from 600 to 700 lb. of dynamite yet to touch off, and this will break up a lot of rock.—*Dell Rapids* (S. D.) *Tribune.*

Manganese Steel vs. Alloy Steel

THE American Manganese Steel Co., in a recent bulletin, gives some interesting data on the comparisons between manganese steel and other alloy cast steels. It is stated that wear is a function only of the surface of the steel and nothing is gained by having a great hardness in the body of the casting. The surface hardness of manganese steel is low at first, but a great hardness quickly develops when used on the working areas that is continuously self-renewing. This property of hardening under working conditions is a virtue exclusive to manganese steel, according to the bulletin.

The fallacy of stressing individually, high hardness, high tensile strength or any such characteristics between manganese steels and other alloy cast steels is pointed out. Table and curves show clearly that the relative performance of manganese steels and other alloy steels has little connection with either Brinell hardness or tensile strength when these test characteristics are considered alone.

The article shows the unfairness of laboratory tests when applied to manganese steel, as that product hardens up under impact and other steels do not. It is also stated that the acquired hardness in manganese steel is permanent and that as fast as the steel is worn or broken away a fresh surface of equal hardness presents itself.

Gulf Coast to Have Bulk Carrier

ONE OF THE MOST UNUSUAL ship remodeling and conversion jobs in recent years will be carried out by the Jahncke Dry Docks, Inc., of New Orleans, on the steamship *Bremerton*, of the Bulk Transportation Co., which has just placed a contract with the yard to change the vessel from an ordinary hand-fired, coal-burning cargo ship into a pulverized coal-burning, self-discharging freighter, in accordance with plans and specifications prepared by Edwin C. Bennett, well-known naval architect and marine engineer of New York.

The *Bremerton* is a steel vessel, 380 ft. long, 53-ft. beam, 23½-ft. draft, and is of 7500 deadweight tons. The ship was built in 1918 by the Seattle Construction and Dry Dock Co. of Seattle, and for the last few years she has been laid up with the Shipping Board's idle fleet in the James river.

At present the *Bremerton* is a conventional two-deck, three-island type, general cargo-carrying vessel, having five cargo hatches and fore and aft main masts fitted with cargo booms. Her machinery, consisting of a triple expansion engine and three single-ended Scotch boilers arranged for hand-fired coal, is located amidships.

The plans prepared by Mr. Bennett indicate that the remodeling will completely change the present appearance of the vessel. It is proposed to move the propelling machinery from amidships to aft, remove the second deck beams and plating and hold stanchions from all three decks, remove the deck bridge, remove the masts, king posts and cargo booms, lengthen the poop some 75 ft., lengthen the forecastle some 74 ft. and run a trunk erection 30 ft. wide and 4 ft. high on the upper deck between the poop and forecastle; install the officers' deck houses and navigating bridges at the after-end of forecastle deck, and the engineers officers' deck houses on the poop deck.

Throughout all cargo holds two scraper tunnels will be built, together with diagonal bilge tanks, so that the cargo of cement, coal, sulphur, sand, ore and similar commodities will automatically run into the scraper tunnels. The Leathem D. Smith patented self-discharging equipment and machinery which will carry this cargo from the scraper tunnels to an endless belt running on a 140-ft. boom, standing on the trunk deck, which will discharge it ashore at the rate of approximately 1000 tons per hour up to 114 ft. from the ship's side, during which operation the cargo will be automatically weighed as it passes over the discharging belt.

In place of the present five cargo hatches the cargo will be loaded into the vessel through 12 large hatches, each 26 ft. by 8 ft. 8 in., clear opening.

In order to increase the efficiency of operation of vessel the boilers will be arranged to burn pulverized coal by the Todd unit system of pulverizers, the coal bunkers being arranged to be self-feeding the pulverizers and thus do away with the coal-elevating gear. The rudder will also be stream-lined on the Oertz principle.

When completed the *Bremerton* will be the first American-owned self-discharging vessel on the Atlantic, Gulf and Pacific seaboards and the first pulverized coal-burning vessel operating from Gulf ports.—*New York (N. Y.) Herald-Tribune.*

Plans for International Road Congress

J. TRUEMAN THOMPSON, professor of civil engineering at Johns Hopkins University, has been appointed manager of the sixth international road congress, it was announced June 25 by Thomas H. MacDonald, Chief of the Bureau of Public Roads and secretary general of the American Organizing Commission in charge of the conference. The commission is a special federal agency directed by the Department of State.

About 45 nations will take part in the conference, Mr. MacDonald said. The congress, which will attract leading highway engineers, administrators and economists from virtually every civilized country in the world, will meet in Washington, October 6 to 11, at the invitation of the United States Government.

The meeting in Washington will mark the first time that the international conference of highway experts has been held in the Western Hemisphere, previous sessions having been at Paris, Brussels, London, Seville and Milan. These congresses are under the general direction of the Permanent International Association of Road Congresses, with headquarters in Paris, of which M. LeGavrian is secretary general.

One of Prof. Thompson's duties will be to confer with M. LeGavrian by letter and by cable regarding the many pressing details of transporting delegates from the far corners of the earth to the meeting in Washington, the translation and distribution of reports and addresses, arrangements for the comfort and entertainment of the delegates, and places of meeting. The languages of the congress will be French, Spanish, German and English.

It is expected that the sessions of the congress will be at the building of the Chamber of Commerce of the United States, where ample facilities are afforded for group meetings and for the larger assemblies.

The American Organizing Commission, which has the responsibility for the congress, was named by the Secretary of State, with Roy D. Chapin, chairman of the highways committee of the National Automobile Chamber of Commerce, as president, and Thomas R. MacDonald, Chief of the United States Bureau of Public Roads, as secretary general.

Virtually every person in the United States interested in any phase of highway affairs is expected to attend the congress, according to Professor Thompson, who announces the commission's willingness to supply any organization or individual interested with complete information.

Massachusetts Aggregate Firms in Merger

NEGOTIATIONS pending for some time between Willard M. Pettey, representing Willard M. Pettey, Inc. of Fall River, Mass., and the Cape Cod Sand & Cement Co., of New Bedford and the building materials division of the Borden & Remington Co. of Fall River and New Bedford have resulted in the formation of a new company called Building Materials, Inc.

The new company will have its main office at 139 Front street, Fall River, with warehouses and yards in both Fall River and New Bedford. An authorized capital of $100,000 insures ample financing. It is interesting to note that no outside capital is called for since the companies now joined have always been conservatively managed and well financed, and will supply all funds needed.

Warren F. Sanford, treasurer of Willard M. Pettey, Inc., will act as president and general manager, and the board of directors will be Warren F. Sanford, Willard M. Pettey, Albert A. Harrison, William F. Davis and William E. Fuller.

Willard M. Pettey, long known as "The Sand Man," will still retain an active interest in the business as will also the Borden & Remington Co., although the long familiar name of both of them in the building industry will now disappear in favor of the new company, Building Materials, Inc. Albert A. Harrison is president and general manager of the Borden & Remington Co., whose popular "Boremco" figures are in many lines in Fall River, New Bedford and Providence. William F. Davis is treasurer of the Borden & Remington Co., and a partner in the Richards & Davis Co., William E. Fuller, a lawyer, is connected with the offices of L. Elmer Wood of Fall River.

Joseph McCreary, Edward C. Joerger and Edward Rogerson, members of the old firms, will join the new corporation. All are experienced men in the building industry and contractors and builders will still see the same familiar faces with whom they have done business in the past.

The Fall River warehouse of Building Materials, Inc., will be located at 139 Front street, Fall River, in the geographical center of the city. Warehouses of the New Bedford division will be at 25 Nausett street, and 8 Union street, giving efficient and quick service to and from all sections of the city. Railroad sidings serve all the warehouses, and a fleet of trucks will be maintained to deliver materials in Fall River, New Bedford and the surrounding terrritory.—*New Bedford* (Mass.) *Times.*

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	6-28-30	96	100	
Alpha P. C. new com.[6]	7-12-30	24	26	50c qu. July 25
Alpha P. C. pfd.[2]	7-12-30	112	.....	1.75 qu. Mar. 15
American Aggregates com.[29]	6-28-30	20	25	75c qu. Mar. 1
Am. Aggre. 6's, bonds (w.w.)	7-15-30	87	.....	
American Brick Co., sand-lime brick	6-27-30	.....	5	25c qu. Feb. 1
American Brick Co. pfd.	6- 2-30	72	.....	50c qu. May 1
Am. L. & S. 1st 7's[29]	6-28-30	96	98	
American Silica Corp. 6½'s[49]	7-15-30	No market		
Arundel Corp. new com.	7-12-30	42	.....	75c qu. July 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	7-15-30	30	40	
Beaver P. C. 1st 7's[29]	7-11-30	95	100	
Bessemer L. & C. Class A[4]	7-11-30	29	33	75c qu. May 1
Bessemer L. & C. 1st 6½'s[4]	7-11-30	85	87	
Bloomington Limestone 6's[29]	6-28-30	80	84	
Boston S. & G. new com.[47]	7-12-30	16	19	40c qu. Apr. 1
Boston S. G. new 7% pfd.[47]	7-12-30	46	50	87½c qu. Apr. 1
California Art Tile A	7-11-30	.....	9⅞	43¾c qu. Mar. 31
California Art Tile B	7-11-30	.....	2½	20c qu. Mar. 31
Calaveras Cement com.	7-11-30	.....	12¾	
Calaveras Cement 7% pfd.	7-11-30	.....	88	1.75 qu. July 15
Canada Cement com.	7-14-30	14½	15¼	
Canada Cement pfd.	7-14-30	.....	94½	1.62½ qu. June 30
Canada Cement 5½'s[43]	7-12-30	99⅞	100⅜	
Canada Cr. St. Corp. bonds[43]	7-12-30	95½	.....	
Certain-teed Prod. com.	7-14-30	9	9⅞	
Certain-teed Prod. pfd.	7-14-30	25¼	28	1.75 qu. Jan. 1
Cleveland Quarries	7-14-30	60	65	75c qu. June 1
Columbia S. & G. pfd.	7-15-30	88⅝	94	
Consol. Cement 1st 6½'s. A	7-15-30	80	90	
Consol. Cement 6½% notes	7-15-30	75	80	
Consol. Cement pfd.[29]	6-28-30	50	60	
Consol. Oka S. & G. 6½'s[12] (Canada)	7-14-30	100	101	
Consol. Rock Prod. com.[44]	7-10-30	2¼	3	
Consol. Rock Prod. pfd.[44]	7-10-30	12¼	12¾	43¾c qu. June 1
Consol. Rock Prod. units	7-14-30	27	28½	
Consol. S. & G. pfd. (Can.)	7-14-30	.....	85	1.75 qu. May 15
Construction Mat. com.	7-14-30	15	15¼	
Construction Mat. pfd.	7-14-30	42¾	43	87½c qu. Aug. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	7-11-30	92	95	
Coosa P. C. 1st 6's[29]	6-28-30	50	.....	
Coplay Cem. Mfg. 1st 6's[40]	7-12-30	95	.....	
Coplay Cem. Mfg. com.[40]	7-12-30	10	.....	
Coplay Cem. Mfg. pfd.[40]	7-12-30	60	.....	
Dewey P. C. 6's (1942)	7-15-30	97	.....	
Dewey P. C. 6's (1930)	7-15-30	97	.....	
Dewey P. C. 6's (1931-41)	7-15-30	97	.....	
Dolese & Shepard	7-14-30	75	80	$2 qu. July 1
Dufferin Pav. & Cr. Stone com.	7-14-30	.....	18	
Dufferin Pav. & Cr. Stone pfd.	7-14-30	83½	85	1.75 qu. July 2
Edison P. C. com.[39]	6-28-30	10c	.....	
Edison P. C. pfd.[39]	6-28-30	25c	.....	
Giant P. C. com.[2]	7-12-30	5	15	
Giant P. C. pfd.[2]	7-12-30	15	30	1.75 s.-a. June 16
Gyp. Lime & Alabastine, Ltd.	7-14-30	18¼	18½	37½c qu. July 2
Hermitage Cement com.[11]	7-14-30	30	35	
Hermitage Cement pfd.[11]	7-14-30	85	95	
Ideal Cement, new com.	7-14-30	50	52	75c qu. July 1
Ideal Cement5's, 1943	7-14-30	96	98½	
Indiana Limestone units[29]	6-28-30	.....	100	
Indiana Limestone 6's	7-12-30	79	.....	
International Cem. com.	7-14-30	67	67¾	$1 qu. June 27
International Cem. bonds 5's	7-14-30	100½	.....	Semi-ann. int.
Iron City S. & G. bonds 6's[46]	7-12-30	90	92	
Kelley Is. L. & T. new st'k	7-14-30	36	38	62½c qu. July 1
Ky. Cons. St. com. V. T. C.[48]	7-11-30	9	10	
Ky. Cons. Stone 6½'s[48]	7-11-30	94	98	
Ky. Cons. Stone pfd.[48]	7-11-30	88	92	1.75 qu. Aug. 1
Ky. Cons. Stone com.[48]	7-11-30	9	10	
Ky. Rock Asphalt com.[11]	7-14-30	11	14	40c qu. July 1
Ky. Rock Asphalt pfd.[11]	7-14-30	85	90	1.75 qu. Mar. 1
Ky. Rock Asphalt 6½'s[11]	7-14-30	98	100	
Ky. Rock Asphalts wrts.	7-14-30	3	.....	
Lawrence P. C.	7-12-30	57	63	$1 qu. June 28
Lawrence P. C. 5½'s, 1942	7- 9-30	84½	88½	
Lehigh P. C.	7-16-30	31	32	62½c qu. Aug. 1
Lehigh P. C. pfd.	7-16-30	106⅓	107¼	1¾% qu. July 1
Louisville Cement[7]	7-11-30	230	.....	
Lyman-Richey 1st 6's, 1932[13]	7-14-30	97	99	
Lyman-Richey 1st 6's, 1935[13]	7-14-30	97	99	
Marblehead Lime 6's[14]	7-11-30	85	95	
Marbelite Corp. com. (cement products)	7-11-30	200	.....	
Marbelite Corp. pfd.	7-11-30	12	.....	50c qu. July 10
Material Service Corp.	7-12-30	20	.....	50c qu. June 1
McCrady-Rogers 7% pfd.[32]	7-14-30	49	.....	
McCrady-Rogers com.[23]	7-14-30	20	21½	
Medusa Portland Cement	7-14-30	.....	94	1.50 July 1
Mich. L. & C. com.[6]	7-12-30	25	.....	
Missouri P. C.	7-14-30	39¼	39¾	50c qu. Aug. 1
Monolith Portland Midwest[44]	7-10-30	2½	3	
Monolith bonds, 6's[9]	6-26-30	82½	87½	
Monolith P. C. com.[9]	7-14-30	.....	5	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	7-14-30	.....	5	40c s.-a. Jan. 1
Monolith P. C. units[9]	6-26-30	15½	18½	
National Cem. (Can.) 1st 7's[43]	7-12-30	99½	100½	
National Gypsum A com.	7-14-30	5	6	
National Gypsum pfd.	7-14-30	31	34	
Nazareth Cement com.[26]	7-11-30	22	.....	
Nazareth Cement pfd.[26]	7-11-30	100	.....	
Newaygo P. C. 1st 6½'s[29]	6-28-30	102	103	
New Eng. Lime 1st 6's[14]	7-11-30	No market		
N. Y. Trap Rock 1st 6's	7-12-30	101	.....	
N. Y. Trap Rock 7% pfd.[36]	7-14-30	95	.....	1.75 qu. Apr. 1
North Amer. Cem. 1st 6½'s	7-14-30	59¾	.....	
North Amer. Cem. com.[29]	6-28-30	2	4	
North Amer. Cem. 7% pfd.[29]	6-28-30	22	27	
North Amer. Cem. units[29]	6-28-30	25	30	
North Shore Mat. 1st 5's[15]	7-15-30	95	.....	
Northwestern States P. C.[37]	7-12-30	110	120	$2 Apr. 1
Ohio River Sand com.	7-14-30	.....	17	
Ohio River Sand 7% pfd.	7-14-30	97	.....	
Ohio River S. & G. 6's[16]	7-12-30	85	90	
Oregon P. C. com.[20]	7-11-30	6	11	
Oregon P. C. pfd.[20]	7-11-30	92½	98	
Pacific Coast Aggregates pfd.	7-14-30	.....	10½	
Pacific Coast Cement 6's[5]	7-10-30	75	77	
Pacific P. C. com.[5]	7-10-30	15	25	
Pacific P. C., new pfd.[5]	7-10-30	.....	80	1.62½ qu. July 5
Pacific P. C. 6's[5]	7-10-30	99½	.....	
Peerless Cement com.	7-11-30	7½	8	
Peerless Cement pfd.	7-11-30	78	82	1.75 Apr. 1
Penn.-Dixie Cement pfd.	7-14-30	35	51	
Penn.-Dixie Cement com.	7-14-30	7⅞	8	
Penn.-Dixie Cement 6's	7-14-30	78	.....	
Penn. Glass Sand Corp. 6's	7- 9-30	102	104	
Penn. Glass Sand pfd.	7- 9-30	110	.....	1.75 qu. July 1
Petoskey P. C.	7-14-30	9	10	15c qu. Apr. 1
Port Stockton Cem. units[9]	2-17-30	.....	30	
Port Stockton Cem. com.[20]	7-11-30	No market		
Riverside Cement com.[5]	7-10-30	11	14	
Riverside Cement pfd.[20]	7-11-30	70	75	1.50 qu. Aug. 1
Riverside Cement, A[20]	7-11-30	11	15	31¼c qu. Aug. 1
Riverside Cement, B[20]	7-11-30	2	.....	
Roquemore Gravel 6½'s[37]	7-14-30	99	100	
Santa Cruz P. C. 1st 6's, 1945[5]	7-10-30	105½	.....	6% annually
Santa Cruz P. C. com.[5]	7-10-30	90	.....	$1 qu. July 1
Schumacher Wallboard com.	7-11-30	10	13	
Schumacher Wallboard pfd.	7-11-30	21½	26	50c qu. May 15
Southwestern P. C. units[45]	7-10-30	240	.....	
Standard Paving & Mat. (Can.) com.	7-14-30	16	17	50c qu. May 15
Standard Paving & Mat. pfd.	7-14-30	85	87	1.75 qu. Feb. 15
Superior P. C., A[20]	7-11-30	36	37	27½c mo. Aug. 1
Superior P. C., B[20]	7-11-30	10	11	25c qu. Mar. 20
Trinity P. C. units[37]	7-12-30	130	140	
Trinity P. C. com.[37]	7-12-30	30	40	
Trinity P. C. pfd.[29]	6-28-30	110	120	
U. S. Gypsum com.	7-14-30	44	44½	40c qu. June 30
U. S. Gypsum pfd.	7-14-30	116	118	1.75 qu. June 30
Universal G. & L. com.[3]	7-15-30	No market		
Universal G. & L. pfd.[3]	7-15-30	No market		
Universal G. & L., V. T. C.[3]	7-15-30	No market		
Universal G. & L. 1st 6's[3]	7-15-30	No market		
Warner Co. com.[16]	7-12-30	37	41	50c qu.& 25c ex. July 15
Warner Co. 1st 7% pfd.[16]	7-12-30	96	100	1.75 qu. July 1
Warner Co. 1st 6's (w. w.)	7-15-30	97	98	
Whitehall Cem. Mfg. com.[38]	7-14-30	80	.....	
Whitehall Cem. Mfg. pfd.[38]	7-14-30	50	.....	
Wisconsin L. & C. 1st 6's[15]	7-15-30	95	.....	
Wolverine P. C. com.	7-14-30	4½	5	15c qu. May 15
Yosemite P. C., A com.[20]	7-11-30	2¼	2¾	

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Beadling & Co., Youngstown, Ohio. [5]Freeman, Smith & Camp Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simon & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Atlantic Gypsum Products Co. 6's, 1941, $4,000 and 40 shs. com.[1]	35%	.....
Atlantic Gypsum Products 6's, 1941, $5,000; 50 shs. com. as bonus[3]	49%	.....
Consolidated Cem. com. v.t.c., 3220 shs.[3]	1½ per share	.....
Indiana Limestone deb. 7's, 1936, with warrants ($1,000)[4]	$500 for the lot	.....

[1]Price at auction by Wise, Hobbs & Arnold, Boston, Dec. 18, 1929. [3]Price at auction by R. L. Day & Co., Boston, Dec. 18, 1929. [4]Price at auction by Adrian H. Muller & Son, Dec. 26, 1929.

Warner Company Outlook in Philadelphia

CURRENT BOOKINGS of the Warner Co., Philadelphia, Penn., indicate good deliveries of its manufactured materials, especially of its central mix concrete, over the next four months, so that company faces a continuation of favorable earning conditions for the third quarter.

Program of building construction in the Philadelphia area by the various railroads and the city is now moving rapidly underway, in addition to the several new office buildings and extensions either planned or in course of construction, and indicates a steadily growing demand for central mix concrete.

This Warner product is delivered ready for use in agitator trucks eliminating the time, space and expense of mixing small quantities of concrete and at the same time assuring the buyer a uniform product complying with the standards of present advanced engineering and construction design. Since the first of the year the company has spent $175,000 in the Philadelphia delivery division for improvement of trucking facilities and additional agitator truck units.

Earnings so far this year have been running at a satisfactory rate. In the first quarter the company covered all of the current charges for interest and preferred dividends, despite the fact that, normally due to seasonal conditions, building operations reach the lowest point of the year over that period.

For the first nine months of its operation, ended December 31, 1929, the Warner Co. reported net income of $1,318,130, equivalent after preferred dividends to $4.25 a share on the then outstanding 204,727 shares of no-par common stock.

During the past winter and early spring, Warner Co. effected a number of economies in plant operation and, in addition, planned to expand business of profitable departments. At its up-river operations on the Delaware, a few miles below Trenton, and on the Pennsylvania railroad between Tullytown and Morrisville, improvements aimed to effect further economies in handling and sizing the dredged sand and gravel products were completed at the three larger units, "Manor," "Terminal" and "Van Sciver" plants. Furthermore, a consolidation was effected involving three of the smaller units in that area by which one improved plant does the work of three.

Recent extensions included the enlarging of carloading facilities at the local Berks street plant to permit the handling of from 80 to 100 carloads a day. The new rock crushing plant there has been completed and is in operation, as is the additional Smith mixer in the new central concrete plant. The mixer was the third to be installed, and made the Berks street plant the largest of the Warner central mix plants with an estimated daily capacity of over 1700 cu. yd. of concrete.

The Warner Co.'s first 12 months of operations were concluded April 30, last, and over the period the company retired $1,366,620 of underlying obligations through bond and preferred stock sinking fund operations and payments on purchase money contracts, which effected savings in interest and preferred stock dividend charges at the rate of $72,031 annually.—*Wall Street* (New York City) *Journal.*

Schumacher Wall Board Corp. Balance Sheet

THE ANNUAL EARNINGS and balance sheet statement of the Schumacher Wall Board Corp., Los Angeles, Calif., gypsum products manufacturer, is reported as follows:

NET EARNINGS, AFTER ALL CHARGES

	1930	1929
Years ended April 30	$97,207	$24,000
Earned per share, common	$1.47	$0.36

Based on 66,000 common shares.

BALANCE SHEET AS OF APRIL 30, 1930

ASSETS

Fixed assets (less depreciation)	$1,389,277
Investments	200,073
Current assets	304,439
Deferred charges	144,239
Total	$2,038,028

LIABILITIES

Capital stock	$1,727,596
Current liabilities	99,760
Capital surplus	103,664
Earned surplus	107,008
Total	$2,038,028
Current assets	$ 304,439
Current liabilities	99,760
Working capital	$ 204,679

During the year the bank indebtedness of $125,000 was entirely paid off, and in addition the company increased its investment in the Gypsum Products Corp. of Seattle, Wash.

McCrady-Rodgers Co. Stock Listed

THE PITTSBURGH STOCK EXCHANGE has approved for listing 13,000 shares of 7% cumulative convertible preferred stock (par $50) and 144,353 shares of no par value common stock of the McCrady-Rodgers Co., Pittsburgh, Penn.

Capitalization—

	Authorized	Outstanding
Preferred stock, shares	13,000	13,000
Common stock, shares	*250,000	144,353
First mortgage 6% convertible sinking fund gold bonds	$650,000	$650,000

*Of this amount a sufficient number of shares have been reserved to provide for conversion of the first mortgage bonds and the 7% preferred stock.

The company was incorporated in Pennsylvania for the purpose of acquiring and combining the assets and business of McCrady Brothers Co. and Rodgers Sand Co.

Lyman-Richey Sand and Gravel Co. Statement

THE FOLLOWING is the reported annual income account and balance sheet statement for the year ending December 31, 1929, of the Lyman-Richey Sand and Gravel Co., Omaha, Neb.:

INCOME ACCOUNT, YEARS ENDED DECEMBER 31

	1929	1928
Sales	$1,237,661	$ 876,610
Cost of sales, etc.	756,604	623,982
Depreciation and depletion	133,750	112,405
Net earnings	347,307	140,223
Other income	15,623	6,568
Total income	362,930	146,791
Interest charges	30,627	33,772
Miscellaneous charges	21,852	29,320
Taxes	44,249	11,487
Balance	$ 266,202	$ 72,212
Earned per share common	$26.88	$6.87

BALANCE SHEET AS OF DECEMBER 31

ASSETS

	1929	1928
Property	$1,749,292	$1,549,780
Current assets:		
Cash	65,896	48,058
Notes receivable and warrants	211,272	9,383
Accounts receivable (net)	298,678	229,682
Inventories	22,277	21,148
Other assets	28,428	141,931
Deferred charges	85,672	45,774
Total	$2,461,515	$2,045,756

LIABILITIES

Preferred stock	$ 60,000	$ 60,000
Common stock	990,400	990,400
Bonded debt	343,800	391,300
Long term notes	97,000	35,600
Current liabilities:		
Notes payable	51,166	7,808
Accounts payable	70,880	61,736
Accrued interest, etc.	8,771	9,323
Reserve for taxes	42,500	11,400
Depreciation reserve	416,812	298,011
Surplus	380,186	180,178
Total	$2,461,515	$2,045,756
Current assets	$ 598,123	$ 308,271
Current liabilities	173,317	90,267
Working capital	$ 424,806	$ 218,004

Revised Management—Officers: H. F. Curtis, president; L. C. Curtis, vice-president and general manager; F. P. Curtis, vice-president; E. H. Palmquist, treasurer. Directors: H. F. Curtis, L. C. Curtis, M. E. Handler, Omaha, and J. W. Curtis, Columbus, Neb.

Number of employes December 31, 1929, 170. Number of stockholders December 31, 1929, preferred, 2; common, 18.

Dividends—Company paid dividends of 6% on common stock in 1929.

Trustee—First Trust Co., Omaha, Neb., is trustee and interest paying agent for company's first 6% bonds. As of June 14, 1930, there were $343,800 of the bonds outstanding; amount retired, $156,200. The final principal amount due June 1, 1935, has been reduced to $163,800.

COMBINED EARNINGS OF McCRADY BROTHERS CO. AND RODGERS SAND CO.

Calendar years	1926	1927	1928	1929
Profit from manufacturing or trading	$648,648	$508,752	$648,961	$740,473
Selling expense	41,248	62,112	71,222	88,210
General and administrative expenses	200,938	212,685	239,107	236,234
Profit from operations	$406,461	$233,954	$338,631	$416,028
Other income (net)	45,853	65,492	35,982	34,742
Net profit	$452,314	$299,446	$374,614	$450,770
Federal tax at rate of 11%	49,754	32,939	41,207	47,345
Interest	.....	.....	.....	20,360
Net profits	$402,560	$266,507	$333,407	$383,065

Dominion Trap Rock Co. Liquidated

PURSUANT to a judgment of the Superior Court, Montreal, Canada, dated November 13, 1929, the assets of this company have been sold to Max B. McKee and Mark T. McKee, of Detroit, Mich., and the consideration price will be paid, applied and distributed in accordance with the following scheme of arrangement:

(*a*) Privileged claims.—Payment in full.

(*b*) Creditors secured by liens on machinery to have the following options:

Option No. 1.—100% of claims in 7% first mortgage bonds of a new company to be formed.

Option No. 2.—50% of claims in cash and 50% in preference stock of a new company.

(*c*) Ordinary creditors to have the following options:

Option No. 1.—10% of all claims in cash in full settlement.

Option No. 2.—100% of all claims in preferred stock in full settlement.

(*d*) Liquidation expenses.—All expenses, including liquidator's, inspectors' and solicitors' fees to be paid in full.

(*e*) Class A and Class B shareholders.—20,000 common shares of a new company for distribution among the class A shareholders.

No distribution will be made to class B shareholders.

The purchasers agree to form a new company, *Trap Rock Limited*, to carry on the business which is to be capitalized as follows:

1. An authorized issue of $500,000 first mortgage 7% 15-year sinking fund bonds. It is contemplated that $375,000 will be presently issued to provide funds to recondition the plant and the necessary working capital.

2. An authorized issue of $200,000 preferred stock callable at any time without previous notice at par. The amount authorized was limited to the amount required for settlement with those creditors of the Dominion Trap Rock Co., Ltd., who elect to take such preference stock. In the event of a sale or liquidation the preference stock is to be paid in full before anything is paid to the common shareholders. Further, out of the net earned profits of the company there shall be set aside each year $25,000, which is to be used to retire each year preference stock of a like amount, callable by lot. No dividends are to be paid on the common stock in any year until such sum of $25,000 has been provided and if in any year the profits do not amount to a sum sufficient to provide the said $25,000, such deficiency shall be added to the sum to be provided in the next succeeding year or years. There will be issued $189,410.

3. An authorized issue of 300,000 shares of common stock.—It became necessary for the creditors secured by liens on machinery and the ordinary creditors to state which of the optional forms of settlement they wished to accept. According to the terms of the sale agreement, each creditor not specifically optating was held to have elected to accept Option No. 1 in his respective class of creditors.

The stockholders and creditors on February 28 approved the arrangement.

Kentucky Consolidated Stone Co. Statement

THE FISCAL YEAR of the Kentucky Consolidated Stone Co., Louisville, Ky., crushed stone producer, ended April 30, 1930. The company reports a balance sheet as follows:

ASSETS

Cash, accounts receivable and inventories	$ 291,768.73
Sinking funds	568.12
Stone deposits, plants and equipment	5,056,339.62
Deferred and other assets	201,911.44
	$5,550,587.91

LIABILITIES

Accounts payable	$ 117,798.50
First mortgage 6½% gold bonds	889,500.00
Reserves for depreciation and depletion	304,818.91
Capital stock—7% preferred	552,200.00
Surplus by appraisal	3,481,954.57
Undivided profit	204,315.93
	$5,550,587.91

UNDIVIDED PROFIT ACCOUNT

Undivided profit, April 30, 1929	$ 76,568.20
Profit for year ending April 30, 1930	167,260.98
	$ 243,829.18
Dividends on 7% preferred stock	39,513.25
Undivided profit, April 30, 1930	$ 204,315.93

At the stockholders' meeting April 27 the following were elected directors of the company for the fiscal year beginning May 1, 1930: Dunlap Wakefield, chairman, A. J. Hoffman, I. W. Iglehart, Monro B. Lanier and H. A. Orrick.

At a meeting of the new board of directors the following officers were elected: Monro B. Lanier, managing director; Dunlap Wakefield, chairman of the board; A. J. Hoffman, president; Sterling S. Lanier, Jr., vice-president and consulting engineer; Verne C. Morgan, secretary and treasurer; C. W. Lovell, chief engineer and sales manager.

Recent Dividends Announced

Bloomington Limestone pfd. (qu.)	$1.75,	July 1
Construction Materials pfd. (qu.)	0.87½,	Aug. 1
Kentucky Cons. Stone pfd. (qu.)	1.75,	Aug. 1
Pacific Portland Cement pfd. (qu.)	1.62½,	July 5
Riverside Cement 1st pfd. (qu.)	1.50,	Aug. 1
Riverside Cement Class A (qu.)	0.31¼,	Aug. 1
Superior Portland Cement Class A (mo.)	0.27½,	Aug. 1

Arundel Earnings for May

THE ARUNDEL CORP., Baltimore, Md., producer of sand and gravel and dredging contractor, reports:

Period ending May 31:	1930—Month—	1929	1930—5 mos.—	1929
Net profit after depreciation, federal taxes, etc.	$221,196	$173,088	$851,739	$617,493
Earnings per share on 493,500 shares common stock (no par)			$1.73	$1.25

Canada Cement's Prospects Good

ALTHOUGH SALES of Canada Cement Co., Ltd., thus far this year have been somewhat below 1929, earnings of company for full fiscal year, ending November 30, next, are not likely to be far from the unusually high level of last year.

For 12 months ended November 30, 1929, company reported net income of $1,600,701, after depreciation, interest and reserves, equivalent after 6½% preferred dividend requirements to 38 cents a share on 600,000 shares no-par common stock. This compared with net income in 1928 of $1,396,951, or 5 cents a common share.

The company is just entering its busy season, as large bulk of shipments is made during the summer months. Shipments during the winter months usually represent scarcely 10% of the year's total, although this percentage is showing an upward trend as winter construction work increases.

This year continued demand for cement for the huge hydro-electric projects under construction in the Dominion is keeping sales up to a high level, in the face of falling off in some lines of building due to the general business depression. Important orders have been received for such projects as the new Abitibi Power & Paper hydro-electric development in northern Ontario, the Beauharnois development on the St. Lawrence River and similar undertakings.

In addition, certain Canadian provinces are building cement roads this winter to attract the increasingly important tourist business.

The Canada Cement Co.'s export business continues to be handicapped by lower labor costs and lower ocean freight rates of European competititors. Improvement of distribution facilities in eastern Canada, however, probably will stimulate shipments abroad. Recently, storage bins and packing plants were completed at Halifax and Quebec, and this summer similar facilities will become available at St. John. A new 3,500,-ton vessel supplies these distributing plants with cement and brings back from Nova Scotia gypsum used at the producing plants.

The company during the last year and a half has been renovating its various plants to increase efficiency. By the end of the year the Longue Point plant, at Montreal East, will have been converted to a "wet" process. The Hull, Exshaw, Winnipeg and Port Colburne plants already have been renovated.

The Canada Cement Co. handles approximately four-fifths of the total Canadian cement business, operating 12 plants in four provinces, with a total productive capacity of 12,000,000 bbl. a year.—*Wall Street Journal* (New York City).

International Cement Earnings, Second Quarter

THE International Cement Corp., New York City, reports for quarter ended June 30, 1930, net income of $1,210,282 after depreciation, interest, federal taxes, etc., equivalent to $1.91 a share on 631,356 no-par shares of common stock. This compares with $841,480 or $1.34 a share on 628,883 shares in preceding quarter, and $1,149,788 or $1.86 a share on 619,031 shares in June quarter of 1929.

Net income for six months ended June 30, 1930, amounted to $2,051,762 after above charges, equal to $3.25 a share on 631,356 shares comparing with $2,167,408 or $3.50 a share on 619,031 shares in first six months of previous year.

Income account for quarter ended June 30, 1930, compares as follows:

	1930	1929	1928	1927
Gross sales	$ 9,051,665	$ 9,061,789	$ 8,743,632	$ 7,868,402
Expenses, etc.	6,529,341	6,810,749	6,620,226	5,951,419
Depreciation	788,908	622,914	592,050	470,943
Total income	$ 1,733,416	$ 1,628,126	$ 1,531,356	$ 1,446,040
Interest, taxes, etc.	523,134	478,338	402,827	393,787
Net income	$ 1,210,282	$ 1,149,788	$ 1,128,529	$ 1,142,253

SIX MONTHS ENDED JUNE 30

	1930	1929	1928	1927
Gross sales	$16,291,409	$16,552,825	$15,463,571	$13,842,127
Expenses, etc.	12,035,628	12,441,569	11,641,034	10,500,361
Depreciation	1,279,945	1,069,283	992,099	794,404
Total income	$ 2,975,836	$ 3,041,973	$ 2,830,438	$ 2,547,362
Interest, taxes, etc.	924,074	874,565	633,980	498,816
Net income	$ 2,051,762	$ 2,167,408	$ 2,196,458	$ 2,048,546

FIRST AND SECOND QUARTERS 1930 COMPARED

	2nd quarter	1st quarter
Gross sales	$9,051,665.56	$7,239,744.50
Less packages, discounts and allowances	1,751,906.80	1,424,843.86
Net sales	$7,299,758.76	$5,814,900.64
Manufacturing cost excluding depreciation	$3,549,047.14	$2,930,576.67
Depreciation	788,907.71	491,037.47
	$4,337,954.85	$3,421,614.14
Manufacturing profit	$2,961,803.91	$2,393,286.50
Shipping, selling and administrative expenses	1,228,387.27	1,150,865.94
Net profit	$1,733,416.64	$1,242,420.56
Less interest charges and financial expenses	187,962.54	192,314.35
	$1,545,454.10	$1,050,106.21
Reserves for federal taxes and contingencies	335,171.63	208,625.58
Net to surplus	$1,210,282.47	$ 841,480.63

Lehigh Portland Cement Earnings to May 31

THE Lehigh Portland Cement Co., Allentown, Penn., reports net income, after depreciation, federal taxes, etc., as follows:

	1930	1929
Years ended May 31	$1,942,019	$4,108,567
Earned per share, common	$1.05	$5.74

Number of common shares, 450,348.

Ideal Cement Sales Up

OFFICIALS of the Ideal Cement Co., Denver, Colo., announce sales for the first six months of this year are 295,000 bbl. ahead of the same period last year. Profits likewise for the first six months will be much ahead of profits for the first half of 1929, they said.—*Brooklyn* (N. Y.) *Times.*

South Carolina Patronizes Several Domestic Cement Mills

AS NOTED IN ROCK PRODUCTS, July 5, the state highway department of South Carolina decided not to use imported Belgian cement. Instead contracts have been placed for the state's immediate requirements with the Carolina Portland Cement Co., Charleston, S. C. (dealers); National Cement Co., Birmingham, Ala.; Lehigh Portland Cement Co., Birmingham; Lone Star Cement Co., Alabama, Birmingham; Pennsylvania-Dixie Cement Corp., New York, and the Signal Mountain Portland Cement Co., Chattanooga, Tenn.

Also, the commission has adopted two resolutions of particular interest in view of the first announcement to buy foreign cement. Contractors will now be asked to use South Carolina labor and to purchase South Carolina materials as largely as possible and this policy will be adopted in future contracts. The second resolution proposes to "build our roads most expeditiously, without cessation in any direction."

The first resolution cites the fact that "the recent letting competition was so widespread and bids were so low that not even one South Caroline contractor was successful," and this is one of the grounds for requesting the use of local labor and materials as far as possible, by successful bidders.

According to previously published bids the price on domestic cement averaged approximately $2.53 at point of delivery, netting the mills from 80 c. to $1.50 per bbl.

North American Cement Corp. First Half Earnings

NORTH AMERICAN CEMENT CORP., New York City, reports for six months ended June 30, 1930, a net loss of $49,374 after taxes, depreciation, depletion, interest, etc.

Income account for six months ended June 30, 1930, follows: Net sales, $1,766,545; costs and expenses, $1,332,615; operating profit, $433,930; other income, $17,012; total income, $450,942; interest and amortization, $210,676; depreciation and depletion, $289,640; net loss, $49,374.

Pennsylvania-Dixie Cement Earnings for Year Ending June 30

THE REPORT of the Pennsylvania-Dixie Cement Corp., New York City, for 12 months ended June 30, 1930, shows net profit of $304,553 after depreciation, depletion, interest and federal taxes, equivalent to $2.24 a share on 135,888 shares of 7% preferred stock. This compares with net profit of $975,813 in preceding 12 months, equal after dividends on 7% preferred stock, to 6 cents a share on 400,000 no-par shares of common stock.

	1930	1929	1928
Gross profit	$2,439,080	$3,232,507	.....
Depreciation and depletion	1,390,263	1,362,934	.....
Balance	$1,048,817	$1,869,573	$2,316,326
Interest	692,465	714,431	955,393
Federal taxes	51,799	179,329	
Net profit	$ 304,553	$ 975,813	$1,360,933

Consolidated balance sheet of Pennsylvania-Dixie Cement Corp. as of June 30, 1930, compares as follows:

ASSETS

	1930	1929	1928	1927
*Fixed assets	$24,859,991	$25,735,348	$25,311,576	$26,504,640
Pyra Prot C.	.....	.....	‡1,305,507	.....
Cash	1,899,218	1,402,878	965,791	2,077,416
Notes and accounts receivable	1,122,070	1,374,257	1,879,046	1,682,411
Inventories	2,992,011	3,432,435	2,951,486	3,085,242
Miscellaneous investments	405,763	84,100	118,600	119,500
Insurance fund, etc.	138,920	35,000	35,000	30,000
Deferred charges	20,598	106,926	93,855	67,813
Total	$31,438,571	$32,170,944	$32,660,861	$33,567,022

LIABILITIES

7% preferred stock	$13,588,800	$13,588,800	$13,588,800	$13,000,000
†Common stock	4,000,000	4,000,000	4,000,000	4,000,000
Gold bonds	11,135,000	11,792,000	11,941,960	12,443,000
Accounts payable	242,956	152,515	§676,816	§227,271
Accruals	350,022	380,300	429,974	364,958
Federal tax reserve	95,274	206,377	261,177	531,116
Dividend reserve	.....	.....	.....	320,000
Miscellaneous reserve	111,567	197,564	42,022	59,839
Surplus	1,914,952	1,853,388	1,720,112	2,620,838
Total	$31,438,571	$32,170,944	$32,660,861	$33,567,022

*After depreciation and depletion. †Represented by 400,000 no-par shares. ‡Entire capital stock and properties. §Includes notes payable.

Earnings for the period reflected the low prices of last summer and fall. Some shipments are still being made on contracts taken at that time. However, the average sales price is steadily improving each month, the June average being nearly equal to that of last June. At the present level of selling prices, the company states, indications are that earnings during the last six months of the current year should exceed those of the last half of 1929.

Rock Products Prospects in Northwest

FIGURES recently submitted by the cement industry at the Pacific Northwest Advisory Bureau showed that actual car loadings of cement for the third quarter of 1929 and estimates for the same period during 1930 were:

	Actual Loading 1929	Prospective Loading 1930
July	1520	1730
August	1780	1810
September	1739	1755
Totals	5039	5295

These figures show an increase of 5.1% over the third quarter of 1929.

Actual carloading for the cement products industry for the third quarter of 1929 and estimates for the same period during 1930:

	Actual Loadings 1929	Prospective Load 1930
July	51	53
August	78	81
September	63	66
Totals	192	200

This shows an increase of 4% over the third quarter of 1929.

The increase in cement loadings is attributable to three large construction projects under operation in western Washington and several substantial paving jobs under construction in that territory.

Cement shipments in eastern Washington, northern Idaho and eastern Oregon show a decided decrease on account of the unfavorable economic conditions in the agricultural, mining and lumbering districts, due to the prevailing low prices obtained for commodities produced and manufactured in this territory. There is very little construction work under way in this district as compared with the past four or five years.

Warner Company Sales Ahead of 1929

INCREASED SALES EFFORT on the part of Warner Co., Philadelphia, Penn., brought a larger volume of business during the first half of 1930 than during the same period of 1929, officials said recently.

More salesmen are representing the company at the present time than ever before in its history, officials said in explaining why operations were expanding in the building materials and agricultural limestone departments of the business.

Declines in construction work during 1929 brought the company face to face with a reduced demand for lime to be used in homes, small apartments and store buildings. At the same time sales of materials for use in modern concrete structures started to fall off.

Immediate steps were taken to divert lime, formerly used in construction, to farms in the Eastern coastal plain, where acid soil has been a detriment to crop production. Salesmen are now telling farmers the benefits to be gained through the use of lime, with the result that limestone operations of the company have been maintained on a satisfactory basis.

Believing a change was impending in construction methods, officials of the company developed the central plant method of mixing, whereby concrete is delivered to the construction job all ready for the forms.

Again salesmen were used to tell contractors the advantages of buying concrete already mixed rather than purchasing the materials and doing the work "on the job." Immediate acceptance of the new idea by builders, the company holds, proves that it is economically sound and that further expansion of operations can be looked for.

Reviewing building operations in Philadelphia, Warner officials point out that most of the work being done at the present time is for the account of the City of Philadelphia and large corporations. These organizations are able to take advantage of low material prices and cheap money to a greater extent than those interested in home, apartment, or small building projects.

Many large public and private projects are contemplated which will keep construction work moving briskly for the remainder of the year, it was said, with the possibility that should general business turn upward sooner than expected, congestion might develop through the demand for workers and materials greatly exceeding the available supply. —*Philadelphia* (Penn.) *Record.*

Why Successful Men Read Their Business Journals

THERE IS NO USE in attempting to fight nature or to escape the relentless operation of economic laws. All under the sun that men can do is to try to discover the laws of natural economics and get in line with them. Men and businesses succeed in accord with their ability to discover the natural economics of the situation and comply with those economic requirements, and they inevitably fail when they try to do anything else, particularly when they have tried to escape the results of violating economic laws.

The whole trend of modern science is to discover surer, quicker, easier, cheaper ways of doing everything, making everything, and raising everything. Every laboratory and individual devoting time to research is finding ways of making things better and cheaper. It is this which has produced the steady decline in commodity prices in the last few years. It is this which is making the farmers raise more wheat and more cotton than they ever did before, and it is this that makes it utterly useless to expect that there will ever be anything more than a temporary rise in commodity prices.—GUY M. WALKER in "Manufacturers Record."

Minneapolis Sand and Gravel Statistics

MINNEAPOLIS, MINN., is by far the largest center of sand and gravel production between Chicago and the north Pacific coast, according to the *Minneapolis Tribune*, which continues:

This growing industry, which yearly assumes greater importance in the industrial picture of Minneapolis, is estimated to contribute well over $2,000,000 a year to the city's industrial income.

Figures of gravel and sand production are not compiled for all the companies operating pits in the Minneapolis district, but their total output is placed at an average of 2,000 carloads of gravel and 3,500 carloads of sand a year. This amounts to around 100,000 tons of gravel and 175,000 tons of sand.

Estimates are that more than $200,000 worth of sand and gravel are sold each year for use in cement and concrete construction within Minneapolis. In this city, as in others throughout the country, concrete is playing an increasingly large part in construction of both large and small buildings.

The quantities of sand and gravel used in Minneapolis, extensive as they are, constitute only a small part of the amount of the two materials produced at the pits in the city and its immediate vicinity. Minneapolis and Hennepin county are said to produce nearly if not quite as much sand and gravel as all the rest of Minnesota put together.

Records of the Minneapolis Traffic Association, which is maintained by the Civic and Commerce Association and Chamber of Commerce, show that 1,871 carloads of gravel and 3,357 of sand were dispatched from the city in 1929. Receipts of the two materials amounted to 1,998 cars last year. Most of the incoming shipments originated at points near the city or at least inside Hennepin county.

A fair average price for sand, delivered in Minneapolis, is from $1.10 to $1.20 a cu. yd., while gravel sells at $2.40 to $2.65 laid down on the job. A cubic yard of sand or gravel is the equivalent of 2,800 to 3,000 lb. or somewhere around 1½ tons in weight.

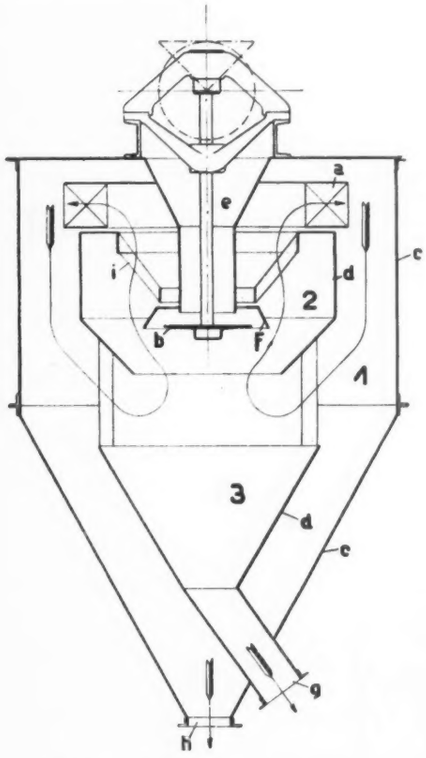
A third major building material, crushed stone, is handled on an extensive scale in Minneapolis, but its production in the city is confined to only three or four quarries. However, some 400 cars of crushed stone were dispatched from Minneapolis last year and over 200 cars were unloaded here.

The figures take no account of finished stone used in blocks or slabs for structural or facing materials. There is a large limestone quarry in northeast Minneapolis which contributes the bulk of finished stone shipped from the city. Outgoing shipments last year amounted to 140 cars of cut stone.

The figures for the first half of 1930, it is estimated, are running somewhat under those for corresponding months of last year, due to the reduced volume of construction in the city and over the northwest.

Foreign Abstracts and Patent Review

Improvement in Air Separator. An improvement has been made in the "Ventoplex" air separator in which the rising stream of air, laden with dust, is rescreened before it reaches the fan. This method makes it absolutely sure that even coarser particles are prevented from being carried along into the flour space, even when the air stream moves at maximum velocity. It is thus possible to allow greater volumes of air to circulate in



Improved German air separator

the separator even in very fine separations, which explains the high output ability of the Ventoplex. — *Tonindustrie - Zeitung* (1930) **54**, 37, p. 631.

Process for Producing Phosphoric Acid and Cement. Phosphorites, bauxite and coal are mixed in desired proportions, then formed into briquettes and then heated under reducing conditions by means of preheating with waste gases in a chamber or other kiln. Since the reduction of the phosphoric acid takes place at an economical rapidity only after a temperature of about 1400 deg. C. has been reached, portions of the material which have already reached a temperature of about 1200 deg. C. are heated quickly to 1400 deg. C. by means of supplementary firing. The phosphorus-bearing gases which discharge during this period are withdrawn separately, in order to prevent rarefaction by the other gases, and are then passed to the phosphorus burning chamber. When using lime phosphates in the reaction mixtures, or aluminum phosphate mixed with lime, cements are obtained, after the expulsion of the phosphorus. These cements are high in alumina and possess considerable strengths. But if aluminum phosphates are treated, which are free of lime, the briquettes from which the phosphorus has been eliminated, can be used for refractory purposes. —German Patent 490,803. *Tonindustrie-Zeitung* (1930) **54**, 34, p. 579.

Influence of Stack Dust on Cement Quality Dependent on Method of Feed. A. Weissmann relates concerning some very great fluctuations in the strength tests of cement produced in a wet-process cement plant in China which occurred in spite of the careful adjustment of the raw mix. These irregularities were traced to the direct charging of the stack dust at the kiln throat, which caused the dust to lump in the slurry, absorb considerable water from the slurry and result in an incomplete burn. When the dust was supplied to the slurry as it accumulated, it mixed irregularly with the slurry. When it was supplied to the raw mill, it absorbed water so vigorously that it clogged the mill. Then the dust was charged to the clay washers by way of a long spiral conveyor and the raw mix adjusted in accordance with the quantity of dust supplied. In this manner the irregularities in strength of the cement were eliminated.—*Tonindustrie-Zeitung* (1930) **54**, 33, p. 563.

Influence of Mixing Time on Strength of Cement. A. Steopoe concludes from his investigations that the influence of the duration of mixing upon the compressive strength of 1:1 liquid mortars is dependent upon the kind of cement and upon the ad-

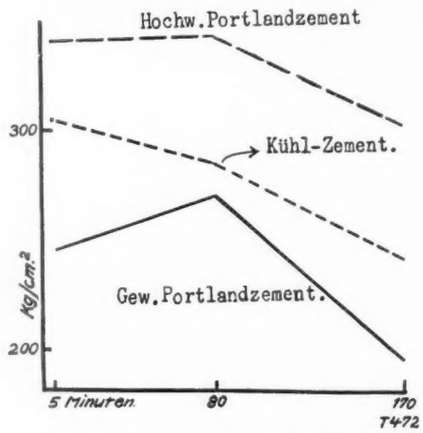


Fig. 1. Showing curves for different pure cements

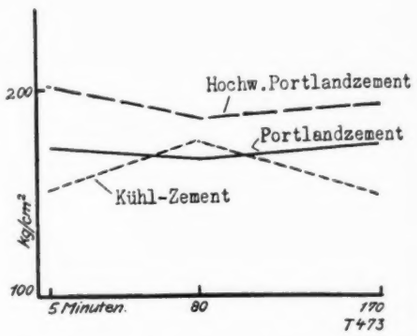
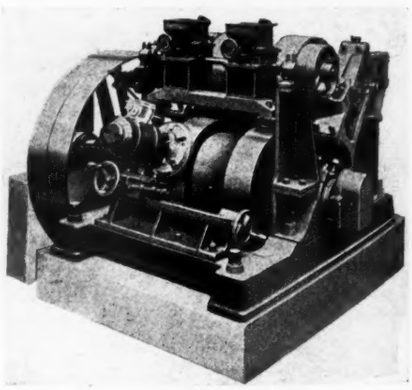


Fig. 2. Curves obtained for different cements to which 25% trass has been added

mixtures. Fig. 1 shows the curves obtained for different pure cements and Fig. 2 the curves obtained for different cements to which 25% trass had been added.—*Tonindustrie-Zeitung* (1930) **54**, 35, pp. 590-91.

Electro-Magnetic Roll Crusher. The roll mill type Ullrich (German patent) is equipped with two rolls located one obliquely above the other with two grinding passages each, so that a greater production is effected. The grinding pressure between the rolls is



New magnetic roll crusher

effected by electrically exciting the lower roll, which at the same time induces magnetically the upper movably located roll. Besides the magnetic pull of the lower roll, their weight is also effective, so that the grinding pressure between both rolls is thereby increased. A new design of feeder supplies the material uniformly.

The magnetic roll mill is especially well suited for fine grinding. The total power consumption for grinding is claimed to be less than with the ordinary roll mill, since the grinding pressure is produced directly at the grinding face, whereas in other well known roll mills the grinding pressure must

be transferred from the bearings to the grinding face, so that great friction losses occur in the bearings. Another advantage claimed for the electro-magnetic roll mill is the fact that the grinding pressure can be adjusted easily by varying the intensity of the current. As the ampere figure is raised or lowered, a greater or smaller grinding pressure is effected between the two rolls. Only about 0.5 kw. is needed to produce the grinding pressure.—*Tonindustrie-Zeitung* (1930) **54**, 40, p. 679.

Congress of Industrial Chemistry at Barcelona. At the Congress of Industrial Chemistry held at Barcelona on October 13, 1929, a number of papers were given which are of interest to the rock products industry. M. G. Baire spoke on the determination of soluble silica in pozzuolana cements. He described several methods employed in determining the soluble silica in cements and then proposed a method for pozzuolana cement and gave analyses. Patricio Palomar spoke on the importance of the manufacture of portland cement in Spain and its relation to other countries. Juan Basso Oliva spoke on the rapid determination of the proportion of Fe_2O_3 (peroxide of iron) in cement by means of trichloride of titanium. —*Revue des Materiaux de Construction et de Travaux Publics* (1930) 245, pp. 61-64; 246, pp. 103-106.

Sulphite Lye Increases Viscosity of Slurry. It is known that the viscosity of raw cement slurry can be influenced considerably by the addition of certain salts. Of particular interest are those admixtures which increase the fluidity of the heavy or thickly fluid slurry. A number of such salts are already known. They are particularly effective when the raw slurry is made from lime and clay, for they act colloid-chemically upon the finely suspended clay. However, these known salts are less effective or almost ineffective upon slurry which has been prepared from lime marls, etc.

K. Biehl has found that the so-called spent sulphite lye obtained from the paper industry is so far the most effective salt for raw slurry prepared from lime marls. He employed the Kohl viscosity meter in measuring the viscosity of the slurry. A slurry was used which was so thick that it could just be handled without trouble by the pump. This standard slurry had a discharge period of 45 seconds at 41.6% water content. The table herewith shows the discharge period of 100 c. c. of slurry in seconds at various percentages of water content and under the influence of different admixed chemicals. Of all admixtures, sulphite lye effected the maximum viscosity. — *Tonindustrie-Zeitung* **54**, 23, pp. 396-397.

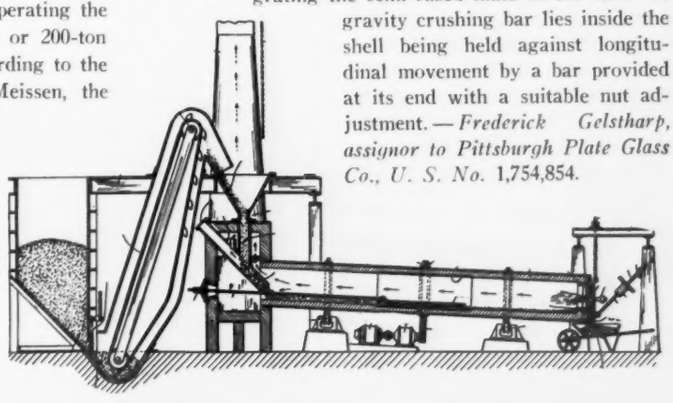
TABLE OF DISCHARGE PERIODS OF 100 CC. THICK SLURRY, IN SECONDS

	Per cent water content determined								
Admixture to slurry	39.3	40.6	41.5	41.6	42.3	42.7	43.0	43.3	43.6
None	.....	*	.....	45.0	.....	.....	27.6	.....	.....
1% gypsum	*	43.3	.....	34.6	.....	25.9	.....	.....	.....
1% soda	*	25.3	.....	18.5	.....	15.2	.....	.....	13.6
$NaSiO_3$, 0.25%	.....	.....	*	.....	36.6	.....	.....	18.9	.....
1% spent sulphite lye; sp. gr. 1.33	40.3	19.3	17.1	.....	14.0	13.6	.....	13.0	.....

*Does not flow.

Slurry Filters and Kiln Heat Losses. The heat lost in operating rotary kilns charged with wet slurry is according to H. Engel as follows: According to Meade in 1926, 44% through the stack, 19% in evaporating the slurry water and 10% by radiation; according to Blanc in 1927, 25.3% through the stack, 30.6% in evaporating the slurry water and 10% by radiation; and according to the German kiln commission in 1928, 32.84% through the stack, 24.5% in evaporating the slurry water and 7.65% by radiation. Meade requires 248,000 calories per 100 kg. clinker, Blanc 240,000 and the kiln commission also 240,000. Meade has a waste-gas temperature of 650 deg. C., Blanc of 350 deg. C. and the kiln commission of 518 deg. C. By utilizing the waste heat in a boiler plant, Meade can generate 20 kw. hr. per barrel of cement, Blanc can produce no kw. hr. and the kiln commission has produced 14.4 kw. hr. per barrel at a plant in Halle.

It is reported that in America the water content of the slurry is reduced to as low as 31%, but one doubts often whether such slurry, even though it may be produced, can really be conveyed. In the new filter processes, slurry with a very low water content, that is, thick slurry, is delivered with pump or bucket conveyor to the filter which removes one-half of the water content; the slurry cake with 18 to 20% water content is then delivered on belt conveyor or by other means to the kiln, into which it is forced by screw conveyor. The quantity of heat required for evaporating the slurry water is thus reduced to one-half and as a result the waste-heat boiler and turbo-generator can produce about 16½ kw. hr. per barrel of cement. Of this, 0.7 kw. hr. per barrel is used for operating the filter of a 1200-bbl. or 200-ton per day kiln. According to the firm Imperial at Meissen, the filters operate better if the slurry to be filtered is preheated to about 35 deg C.—*Tonindustrie-Zeitung* (1930) **54**, 24, pp. 408-409.



Right—Small kiln for calcining a special product

The Societe des Chaux et Ciments de Madagaskar under assistance of French banks plans to build the first cement plant in Madagascar with an annual production of 36,000 tons by the wet-process rotary kiln. The technical investigations are being made by Engineer Michel Steffen, Brussels.—*Zement* (1930), **19**, p. 391.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Ceramic Binding Agents. The invention has for its object improvements in the composition and manufacture of ceramic materials and binding agents.

The use of either burnt magnesite or talcum in the manufacture of ceramic compositions or for binding agents has long been known. The patentees have discovered that substantial advantages can be obtained if the talcum and burnt magnesite are mixed together in definite proportions and have found that ceramic compositions having valuable properties are obtained when the proportion of silica and oxides of bivalent metals is not less than two molecules of metal oxide to one molecule of silicium dioxide, and when on the other side the excess of free magnesium oxide of the burnt product is not so large, that the product approaches pure magnesite stone in composition.

The present invention consists in producing a mixture comprising the proper proportions of talcum and magnesium oxide and heating the mixture at sufficiently high temperature and for a sufficiently long period of time to result in the formation of magnesium orthosilicate. — *Victor Moritz Goldschmidt, Oslo, and Rolf Knudson, Borgestad, near Skien, Norway. United States No.* 1,756,786.

Calcining Apparatus. The invention relates to calcining apparatus designed to carry out a continuous burning or calcining operation in the manufacture of rouge, but may be used to advantage in the calcining of other material. The principal objects of the invention are the provision of an apparatus which will operate continuously and efficiently without clogging. The author proposes to use a small rotary kiln; the only novel feature is a crushing bar for disintegrating the semi-fused mass in the kiln. A gravity crushing bar lies inside the shell being held against longitudinal movement by a bar provided at its end with a suitable nut adjustment. — *Frederick Gelstharp, assignor to Pittsburgh Plate Glass Co., U. S. No.* 1,754,854.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended June 14	Limestone Flux Week ended June 21	Sand, Stone and Gravel Week ended June 14	Sand, Stone and Gravel Week ended June 21
Eastern	3,486	3,475	13,035	12,357
Allegheny	2,951	3,082	9,044	8,693
Pocahontas	785	680	1,510	1,624
Southern	747	612	8,475	8,209
Northwestern	1,220	1,407	8,685	8,733
Central Western	436	430	13,429	12,487
Southwestern	540	433	7,396	7,921
Total	10,165	10,119	61,574	60,024

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

District	Limestone Flux 1929 Period to date June 22	Limestone Flux 1930 Period to date June 21	Sand, Stone and Gravel 1929 Period to date June 22	Sand, Stone and Gravel 1930 Period to date June 21
Eastern	75,579	66,670	178,775	142,063
Allegheny	81,841	63,984	125,155	121,249
Pocahontas	8,585	10,013	17,327	24,221
Southern	12,471	16,562	199,665	179,794
Northwestern	23,698	21,188	100,327	86,555
Central Western	12,879	11,729	205,119	213,342
Southwestern	11,191	10,541	140,089	142,132
Total	226,244	200,687	966,457	909,356

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	1930
Limestone flux	*226,244*	*200,687*
Sand, stone, gravel	*966,457*	*909,356*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning July 12:

SOUTHERN FREIGHT ASSOCIATION DOCKET

51019. **Fluxing stone,** from Carter's Creek and Franklin, Tenn., to Iron City, Tenn. It is proposed to cancel, on the obsolete theory, the present published rates on fluxing stone, carloads, from and to above named points.

51038. **Flint, crushed or ground,** from Erwin, Tenn., Spruce Pine, Minpro and Toecane, N. C., to Syracuse, N. Y. Eighth class rate now applies. Proposed rates on crushed or ground flint, carloads, minimum weight 50,000 lb., from and to points named, 697c per net ton. Same as current rate on feldspar, carloads.

51049. **Sand, furnace, glass, molding, ochre or silica,** carloads, from Big Stone Gap, Va., to Middlesborough, Ky., cancellation. It is proposed to cancel, on the obsolete theory, present published rate of 5c per 100 lb. on the above described commodities, from Big Stone Gap, Va., to Middlesborough, Ky. I. C. C. Docket 17517 rates to apply after cancellation.

51056. **Sand, gravel, slag, stone and chert,** carloads, between points on the A. B. & C. R. R., A. & W. P. R. R., A. C. L. R. R., C. & W. C. R. R., Clinchfield R. R., C. N. & L. R. R., Ga. R. R. and/or W. Ry. of Alabama. It is proposed (a) To amend Section 2 of Agent Glenn's I. C. C. A-655, Freight Tariff 88-A, to provide that Scale 1 (single line scale) will apply for continuous joint hauls over the Atlanta, Birmingham and Coast R. R., Atlanta and West Point R. R., Atlantic Coast Line R. R., Charleston and Western Carolina Ry., Clinchfield R. R., Columbia, Newberry and Laurens R. R., Georgia R. R., and/or Western Ry. of Alabama, between points on these lines. (b) To amend specific point to point rates published in section 1 of Agent Glenn's I. C. C. A-655, and applicable between points on the Atlanta, Birmingham and Coast R. R., Atlanta and West Point R. R., Atlantic Coast Line R. R., Charleston and Western Carolina Ry., Clinchfield R. R., Columbia, Newberry and Laurens R. R., Georgia R. R., and/or Western Ry. of Alabama, so as to not exceed rates yielded between such points under Section 2 of that tariff when amended as suggested in paragraph (a) above.

51066. **Sand, gravel, etc.,** between points in Georgia on the A. B. & C. R. R., A. & W. P. R. R., A. C. L. R. R., C. & W. C. R. R. and/or Georgia R. R. It is proposed to amend Section 3 of Supplement 8 to Agent Glenn's I. C. C. No. A-716, Freight Tariff No. 33-A, to provide that on sand, gravel (washed or unwashed), clay gravel, crushed stone and slag, scale 1 (single line scale) will apply for continuous joint hauls over the A. B. & C. R. R., A. & W. P. R. R., A. C. L. R. R., C. & W. C. Ry. and/or Georgia R. R., between points on these lines.

51067. **Sand, gravel, slag, stone and chert,** carloads, from points on A. B. & C. R. R., A. & W. P. R. R., C. & W. C. Ry., Clinchfield R. R., C. N. & L. R. R., Georgia R. R., and W. Ry. of Ala., to points on A. C. L. R. R., Fort Myers Southern R. R. and Tampa Southern R. R. in Florida; also from points on A. C. L. R. R., Fort Myers Southern R. R. and Tampa Southern R. R. in Florida to points in Georgia on A. B. & C. R. R., A. & W. P. R. R., and Georgia R. R. (a) It is proposed to amend Section 2 of Agent Glenn's I. C. C. A-668, to provide that, in addition to the Florida arbitraries, Scale 1 (single line scale) will apply for continuous joint hauls from points on A. B. & C. R. R., A. & W. P. R. R., C. & W. C. R. R., Clinchfield R. R., C. N. & L. R. R., Georgia R. R., and/or Western Ry. of Alabama, to destinations on A. C. L. R. R., Fort Myers Southern R. R. and Tampa Southern R. R. in Florida, as described in Item 35 of Agent Glenn's I. C. C. A-668, and from stations on A. C. L. R. R., Fort Myers Southern R. R. and Tampa Southern R. R. in Florida, as described in Item 35 of Agent Glenn's I. C. C. A-668, to destinationhs in Georgia on A. B. & C. R. R., A. & W. P. R. R. and Georgia R. R. (b) It is proposed to amend specific point to point rates published in Section 1 of Agent Glenn's I. C. C. A-668, and applicable from and to points on lines as described in paragraph (a) above, so as not to exceed rates yielded between such points under Section 2 of the tariff when amended as suggested in paragraph (a) above.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

51075. **Limestone screenings,** from Dolcito, Ala., to Columbus, Ga., cancellation. It is proposed to cancel, on the obsolete theory, the present commodity rate of 169c per net ton on limestone screenings, carloads, from and to points mentioned. I. C. C. Docket 17517 rates to apply after cancellation.

51113. **Imported crushed marble or marble chips,** from Gulf ports to Atlanta, Ga. It is proposed to establish import rate of 247c per net ton on crushed marble or marble chips, carloads (See Note 3), from New Orleans, La., Gulfport, Miss, Mobile, Ala., and Pensacola, Fla. (shipside), to Atlanta, Ga., not subject to Agent Jones' Combination Tariff I. C. C. U. S. 1.

SOUTHWESTERN FREIGHT BUREAU DOCKET

20310. **Silica rock, crushed,** from St. Clair, Mo., to St. Charles, Mo. To establish a rate of $1.33 per ton of 2000 lb. on silica rock, crushed, carloads, minimum weight 60,000 lb., from St. Clair, Mo., to St. Charles, Mo. At the present time there is no through rate other than classification basis, and the shipper has indicated that he would be willing to pay 60c over rate to St. Louis, Mo., which seems reasonable per se.

20558. **Gravel,** from Pacific and Jedburg, Mo., to Atlanta, Ga. To establish a rate of $3.90 per ton of 2000 lb., from Pacific, Mo., and a rate of $4.01 per ton of 2000 lb. from Jedburg, Mo., on gravel, carloads (See Note 1), and $1.30 of the rate (See Note 2) as to the remainder, except when car is loaded to full visible capacity actual weight shall govern, to Atlanta, Ga. The proposed rates, it is stated, are based on St. Louis, Mo., and Evansville, Ind., combination.

WESTERN TRUNK LINE DOCKET

2269-G. **Sand, molding,** carloads (See Note 3), but in no case shall the minimum weight be less than 40,000 lb., from Dallas City, Ill., to Lincoln, Neb. Present rate, 22½c (Class E); proposed, 14½c.

3478-B. **Sand, carloads,** from Lawrence and Shockey, Kan., to Hallsville, Browns, Stephens, Switzler, Persinger, Moores Switch and Columbia, Mo. Present rate, $2.28 per ton of 2000 lb.; proposed, $1.78 per ton of 2000 lb.

7286. **Sand, silica,** carloads (See Note 2), but not less than 40,000 lb., from Ottawa, Ill., to Sault Ste. Marie, Ont. Present rate, $6.39 per net ton; proposed, $4.34 per net ton.

7249. **Sand and gravel,** carloads, from Browntown, Wis., to Atchison, Kan. Present rate, Class E; proposed, $2.95 per net ton.

7270. **Stone, crushed (granite),** carloads (See Note 2), but not less than 40,000 lb., from Berlin and Utley, Wis., to Keokuk and Ft. Madison, Ia. Present rate, 11½c per 100 lb.; proposed, 11c per 100 lb.

7283. **Sand and gravel,** carloads (See Note 2), but not less than 60,000 lb., except when car is loaded to full visible or space-carrying capacity, in which case actual weight will govern, from Gray's Summit, Jedburg, Mountain Ridge, Pacific, Valley Park, Yeatman, Mo., to St. Louis, Mo. Present rates, 61c per net ton (when for beyond); proposed, cancel the present 61c rate and any through rates to Missouri destinations which have been constructed by using the 61c proportional rate. Also provide that a specific rate of 50c per net ton, minimum weight same as provided above, be published, no switching to be absorbed.

7316. **Sand,** carloads (See Note 3), but in no case shall the minimum weight be less than 40,000 lb., from Boonville, Mo., to Moberly, Mo. Present rate, intrastate rate of 75c per net ton of 2000 lb.; proposed, intrastate rate of 65c per ton of 2000 lb.

7332. **Agricultural limestone,** carloads, minimum weight 80% of marked capacity of car, but not less than 40,000 lb., from Wilson and Rock Spur, Wis., located on the C. St. P. M. & O. Ry. to stations on the C. St. P. M. & O., C. & N. W. and C. M. St. P. & P. Rys. Proposed rates in cents per 100 lb.

Distance	To stations on the C. St.P. M. & O. and C. & N.W. Rys.
250 miles	10
270 miles	10½
300 miles	11
325 miles	11½
375 miles	12

Distance	To stations on the C. M. St.P. & P. Ry.
250 miles	11
275 miles	11½
300 miles	12
325 miles	12½
375 miles	13

ILLINOIS FREIGHT ASSOCIATION DOCKET

4574. **Sand, blast, engine, foundry, glass or molding,** carloads (See Note 1), from Bowes, Ill., to Milwaukee, Wis. Present rate, $1.60 per net ton; proposed, $1.40 per net ton.

5738. To cancel commodity rates on **sand/or gravel,** carloads, from Beech Ridge, Cache, Hodges Park and Sandusky, Ill., on the M. & O. R. R. to junction points in Illinois as published in Item 4160-A and Item 4165 of Agent Galligan's Tariff No. 40, I. C. C. 142, on account of being obsolete.

5740. **Agricultural limestone,** carloads (See Note 1), from Dubuque, Ia., to I. C. R. R. stations in Wisconsin. Rates per net ton, to Clarno, Monroe, Madison, Monticello, Belleville: Present rates, class; proposed, $1.13. Martintown, Dill, Dodgeville: Present rates, class; proposed, $1.26.

5717-A. **Sand and gravel,** from East St. Louis, Ill., and **crushed stone** from Columbia, Krause and

Valmeyer, Ill., to stations on Missouri-Illinois R.R.

Sand and Gravel—East St. Louis to representative points:

	Pres.	Prop.
Selmaville, Ill.	100	100
Sparta, Ill.	75	75
Moffat Mine, Ill.	98	80
Walsh, Ill.	98	80

Crushed Stone—Columbia, Krause, Valmeyer to representative points:

	Pres.	Prop.
Selmaville, Ill.	100	90
Sparta, Ill.	65	65
Moffat Mine, Ill.	65	65
Walsh, Ill.	88	70

5747. **Sand and gravel,** carloads (See Note 2), from Munger, Ill., to Palos Park, Ill. Present rate, 85c; proposed, 76c.

5767. **Sand and gravel and crushed stone,** carloads (See Note 1), to L. & N. R. R. stations:

Crushed Stone—From Anna, Ill., to representative points:

To	Pres.	Prop.	To	Pres.	Prop.
Opdyke	120	115	Hoodville		125
Delafield	120	115	Equality	116	115
Mounie		135			

Sand and Gravel—From Brookport, Metropolis to representative points:

To	Pres.	Prop.	To	Pres.	Prop.
Opdyke		135	Hoodville		135
Delafield		135	Equality		135
Mounie		140			

3985. **Sand and gravel,** carloads, from Allison Branch, Ill., to Golden Gate, Ill. Present rate, class; proposed, $1.14 per net ton.

4693-B. **Stone, crushed,** carloads, from Columbia Quarry and Krause, Ill., to Belleville, Ill. Present rate, 70c per net ton; proposed, 65c per net ton.

5679-A. **Sand and gravel,** carloads, from Chester, Ill., to representative points (rates in cents per net ton of 2000 lb.):

To	Pres.	Prop.
McLeansboro, Ill.	230	115
Enfield, Ill.	230	125
El Dorado, Ill.	230	125
Shawneetown, Ill.	240	135

5751-A. **Sand and gravel,** carloads, from Joliet, Ill., to Reeders and Fayette, Ill. Present rate, $1.25; proposed, $1.13 per ton.

TRUNK LINE ASSOCIATION DOCKET

23973. **Crushed stone,** carloads (See Note 2), from Le Roy and Stafford, N. Y., to Brookland, Penn., $1.45 per net ton. (Present rate $1.60 per net ton.) Reason—Proposed rate is comparable with rates from Le Roy, N. Y., to Gold, Penn.

23982. **Stone, crushed,** carloads (See Note 2), from Le Roy and Stafford, N. Y., to Stanard, Mapes, Shongo, N. Y., and Genesee, Penn., $1.40 per net ton. (Present rate, $1.50 per net ton.) Reason—Proposed rate is comparable with rates from Le Roy to Wellsville, N. Y., Indian Crossing, Penn., Clarmont, Penn., etc.

23984. **Sand, blast, engine, fire, foundry, glass, molding and silica,** carloads (See Note 2), from Santa Clara, N. Y., to Ottawa, Ont., $2 per net ton. (Present rate, combination.) Reason—Proposed rate compares favorably with rates on common sand from and to same points.

23986. **Gravel and sand** (other than blast, engine, foundry, glass, molding or silica), carloads (See Note 2), from Portland, Penn., to Hamburg, N. J., $1.10 per net ton. Reason—Proposed rate is fairly comparable with rate from Kenvil, N. J., to Berlinsville, Penn.

23996. **Crushed stone and screenings,** carloads (See Note 2), from J. C. Stahl, Penn., to Sunbury, Penn., 80c per net ton. Reason—Proposed rate is comparable with rates from and to points in the same general territory.

23998. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville and Tullytown, Penn., to Devault, Penn., $1 per net ton. Reason—Proposed rate is comparable with rate on like commodities for like distances, services and conditions.

23999. **Crushed stone and screenings,** carloads (See Note 2), from Honey Creek, Shraders and Naginey, Penn., to Beaver Springs, Penn., 80c per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

24000. **Sand,** other than blast, engine, fire, foundry, glass, molding, quartz, silex or silica, **and/or gravel,** carloads (See Note 2), from Northeast, Md., to Aberdeen, Md., 65c per net ton. To expire December 31, 1930. Reason—To meet motor truck competition.

24005. **Glass sand,** carloads (See Note 2), from Tatesville, Penn., to specific points in C. F. A. territory as named in Items 6165, and 6380 to 6410, inclusive, and as amended in Agent Curlett's I.C.C. A265. Proposed rate same as now applicable from Mapleton, Penn., as published in the items referred to. Reason—To place Tatesville on comparable basis with Mapleton, Penn.

23759. Amend **Rate Proposal 23759 covering lime and limestone,** from Bellefonte and Pleasant Gap, Penn., to Forest Grove, N. J., Richland and Pleasantville, N. J., by adding B. & O. R. R. points, Frederick, Security, Md., Martinsburg, Charleston, W. Va., Winchester, Cedar Creek, Strasburg, Va., groups as points of origin, at the same rates as proposed from Bellefonte and Pleasant Gap, Penn.

*24029. To increase rate of 50c to 60c per net ton on **crushed stone,** carloads (See Note 2), from Honey Creek, Shraders and Naginey, Penn., to Lewistown, Penn. Reason—As the road work for which the present rate was established has been completed, it is desired to reinstate the former rate in effect.

24036. **Gravel and sand,** N. O. I. B. N., in open cars, except blast, engine, foundry, glass, quartz, silex and silica, carloads (See Note 2), from Shickshinny, Penn., to Scranton, Penn., 70c per net ton. (Present rate, 80c per net ton.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

24037. **Gravel and sand** (other than blast, engine, fire, foundry, glass, molding or silica), carloads (See Note 2), from Mt. Bethel, Portland and Stier, Penn., to Ringtown, Penn., $1.50 per net ton. (Present rate, $1.75 per net ton. Reason—Proposed rate is same as now in effect from Portland, Penn., to Doylestown, Penn.

24042. (A) **Gravel, carloads;** (B) **crushed stone,** carloads; (C) **pebbles,** carloads (See Note 3), from Tioga Street station, Philadelphia, Penn. (rates in cents per 2000 lb.):

To	(A)	(B)	(C)
Ardmore to Rosemont, Penn.	80	70	80
Villa Nova to Strafford, Penn.	80	75	80
Devon to Paoli, Penn.	80	80	80
Darby to Glenolden, Penn.	....	75	80
Norwood to Crum Lynne, Penn.	....	80	80
Baldwin to Hog Island, Penn.	....	80	80
Chester Stations, Penn.	....	80	90
Garrett Road to Grassland, Penn.	....	80	90
Foxcroft to Newtown Square, Penn.	....	80	90
Lansdowne to Morton, Penn.	....	80	90
Swarthmore to Madia, Penn.	....	80	90
Atlantic City, N. J.	125	120	....

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

24051. **Sand, common or building** (not blast, engine, fire, foundry, glass, molding or silica) **and gravel,** carloads (See Note 2), from Tioga, Penn., to Jackson Summit, Trowbridge and Millerton, Penn., $1 per net ton. (Present rate, $1.25 per net ton.) Reason—Proposed rate is comparable with rates from Winburne, Penn., to Waterville and Ramseys, Penn.

23955. **Crushed stone and screenings, including limestone and limestone screenings,** carloads (See Note 2), from Hillsville and Walford, Penn., to Carl, Penn., $1, and Limestone, Penn., $1.10 per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

23973. **Crushed stone,** carloads (See Note 2), from Jamesville and Rock Cut, N. Y., to Brookland, Penn., $1.90 per net ton.

24078. **Sand** (other than blast, engine, foundry, glass, molding or silica) **and gravel,** carloads (See Note 2), from Falls, Penn., to Mehoopany, Penn., 55c per net ton. Rate to expire December 31, 1930. Reason—To meet motor truck competition.

24079. **Gravel and sand,** other than blast, engine, fire, foundry, glass, molding and silica, carloads (See Note 2), from Mt. Bethel, Portland and Stier, Penn., to Hazleton, Penn., Weatherly and Stockton, Penn., $1.30 per net ton. (Present rate, $1.60 per net ton.) Reason—Proposed rate is comparable with rate to Pottsville, Penn.

24084. **Gravel and sand** (other than blast, engine, fire, glass, molding or foundry, quartz, silex and silica), carloads (See Note 2), from Port Covington (Baltimore), Md., to Westminster, Md., 80c per net ton. (Present rate, 90c per net ton.) Proposed rate to expire December 31, 1930. (Reason—Proposed rate is comparable with rates from Pasadena, Bowie Road, etc.)

24090. (A) **Sand,** carloads, in open top equipment; (B) **sand,** in box cars and **other closed** equipment, carloads (See Note 2), from Raritan River R. R. points to Baltimore, Md.: (A), $2.20 and (B), $2.40 per net ton. Reason—Proposed rates are comparable with rates from South Jersey points to Baltimore stations.

24105. **Sand and gravel,** other than blast, engine, foundry, glass, molding or silica, carloads (See Note 2), from Weehawken, N. J., to Scranton, Penn., $1.40 per net ton. (Present rate, $1.95 per net ton.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

24106. (A) **Sand,** carloads, in open-top cars; (B) **Sand,** carloads, in box cars or closed equipment (See Note 2), from Toms River, N. J., to Steelton, Penn., (A) $2.10 and (B) $2.35 per net ton. [Present rates, (A) $1.75 and (B) $1.89 per net ton.] Reason—Proposed rates are comparable with rates from Manumuskin, Millville, Menantico, N. J., etc., to Harrisburg, Penn.

CENTRAL FREIGHT ASSOCIATION DOCKET

25469. To establish on **sand and/or gravel,** carloads (See Note 2), from Joliet and Plainfield, Ill., to Michigan City, Ind., rate of 88c per ton via E. J. & E. and P. M. Ry. Present rate, 95c per ton.

25471. To establish on **crushed stone,** carloads (See Note 3), from North Baltimore, O., to Lexington, O., rate of 80c per ton of 2,000 lbs., for single line haul of 85 miles. Present rate, 90c per ton of 2000 lb.

25473. To establish on **fluxing stone and furnace stone,** carloads (See Note 3), Carey and McVittys, O., to Jackson, O., rate of $1.13 per gross ton. Present rate, classification basis, sixth class.

25487. To establish on **sand and gravel,** carloads (See Note 3), Chillicothe, O., in cents per net ton.

To Ohio points—

	Prop.	Pres.		Prop.	Pres.
McArthur	80	90	Starr	85	90
Creola	80	90	Union Furnace	90	100
Orland	85	90	Logan	90	100
New Plymouth	85	90			

25490. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) **and gravel,** carloads (See Note 3), Manchester, Mich., to Toledo, O., rate of 70c per net ton. Present rate, $2.60 per net ton.

25492. To establish on **agricultural limestone, unburned,** in open top cars only; **crushed stone,** in open cars in bulk only, and **stone screenings,** in straight or mixed carloads (See Note 3), from Kokomo, Ind.

To	Pres.	Prop.
Campbellstown, O.	Class basis	105
Eaton, O.	Class basis	105
Camden, O.	Class basis	115

25507. To establish on **sand,** other than molding, blast, core, engine, etc., carloads (See Note 3), Liberty Center, O., to Toledo, O., rate of 70c per net ton. Route—Via Wabash Ry. Present rate, 11½c.

25568. To establish on **sand** (all kinds) **and gravel,** carloads (See Note 3), Kent Sand and Gravel Pit, Ohio,

To	Pres.	Prop.
Ashtabula, Ohio	110	110
North Randall, Ohio	90	80

25574 (cancels White Docket Advice 21055). (2) To establish on **crushed stone, sand and gravel and slag,** carloads (See Note 3), from Chicago, Ill., and points taking same rates as shown in C. F. A. L. Tariff 197K, to points in Michigan, rates as shown in Exhibit "C" attached. Present rates, as shown in Exhibit "C" attached.

EXHIBIT "C"

From Chicago, Ill., and points taking same rate as published in Agent Jones' 197K (in cents per net ton).

To (representative points)	Present rates—Crushed stone	Sand and gravel	Slag
Glendora, Mich.	101	115	126
Hickory Creek, Mich.	101	115	101
Three Rivers, Mich.	120	138	120
Colon, Mich.	140	161	140
Dowagiac, Mich.	120	138	120
Grand Jct., Mich.	135	138	164
Battle Creek, Mich.	125	161	125
Marshall, Mich.	140	161	140
Jackson, Mich.	140	161	140
Hastings, Mich.	140	161	189
Caledonia, Mich.	140	161	189

Present rate from Joliet, Ill., E. J. & E., I. C. C. 2122

	Crushed stone	Sand and gravel	Slag
Glendora, Mich.	101	101	126
Hickory Creek, Mich.	101	101	101
Three Rivers, Mich.	120	120	120
Colon, Mich.	140	140	140
Dowagiac, Mich.	120	120	120
Battle Creek, Mich.	125	125	125
Grand Junction, Mich.	135	135	164
Marshall, Mich.	140	140	140
Jackson, Mich.	140	140	140
Hastings, Mich.	140	161	189
Caledonia, Mich.	140	161	189

	Prop. rate
Glendora, Mich.	101
Hickory Creek, Mich.	101
Three Rivers, Mich.	120
Colon, Mich.	140
Dowagiac, Mich.	120
Grand Jct., Mich.	135
Battle Creek, Mich.	125
Marshall, Mich.	140
Jackson, Mich.	140
Hastings, Mich.	140
Caledonia, Mich.	140

25582. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), Cleveland, O., to Bessemer, Carnegie, Homestead, Pittsburgh, Stoops Ferry, Woodville and Wylie, Penn., rate of $1.20 per net ton. Present rate, $1.60 per net ton.

New Illinois Crushed-Stone Quarry Project

ANNOUNCEMENT was made recently that Markgraf and Lamb, of Joliet, Ill., have leased 80 acres of land on the Robert Murray farm northwest of Pontiac, Ill., and have already begun preparations for the opening of a large stone quarry and stone-crushing plant on the land.

Markgraf and Lamb have en route at the present time a large steam shovel and as soon as it arrives will begin stripping the earth from two acres of land preparatory to beginning the quarrying of stone.

It was also stated that the company has been prospecting on the land for some time by drilling and have found seventeen and a half feet of excellent quality limestone rock on the land. Erection of a machine shop, rock crushing plant and large storage bins will begin shortly, according to Mr. Murray.

The site of the proposed plant is on state highway No. 118—Pontiac to Streator highway—near where it crosses the Wabash railroad tracks. It is proposed to have a switch from the railroad enter the property so that shipments may be made over that line. The concern also expects to specialize in the delivery of its product by trucks.

The concern will deal in rock for road and commercial purposes as well as for agriculture purposes, the stone being of an excellent type for fertilizing. Knowledge that the land was underlaid by an excellent quality of limestone has been known for years. The proposed site for the quarry is but a short distance to the northeast from where the quarry operated by Oliver Buland and Pontiac township is located.

Markgraf and Lamb have been in the crushed stone business in Joliet for a number of years, it is said. Albert E. Markgraf, the senior member of the firm, is at present sheriff of Will county.

It is stated that the plant will employ in the neighborhood of 40 men when operating at full capacity.—*Minonk* (Ill.) *News.*

Flint (Mich.) Products Plant in Merger

PURCHASE of the plant of the Flint Cinder Block and Products Co., Flint, Mich., makers of cinder concrete building units, by the General Cement Products Corp., was announced recently by F. W. Munger, president and general manager of the latter concern. Acquisition of the Flint company and its extensive and modern plant was made possible by the issuance of preferred stock, which was exchanged for the assets of the company.

Mr. Munger was for the past six years general manager of the Detroit Cinder Block and Tile Co. Operation of the Flint plant, which will manufacture and sell complete lines of Straub cinder concrete, Straub "Weldcrete" and sand cement building units, will be under the personal supervision of Mr. Munger. The territory to be supplied by the Flint plant of the General Cement Products Corp. will include the entire northern half of the lower peninsula, above a line drawn westward from Port Huron through Grand Rapids.

"We are now ready," said Mr. Munger, "to supply any required quantity of either cinder concrete or sand concrete building units throughout the entire district. The cinder concrete and Weldcrete products are manufactured under license from the National Building Units Corp. of Philadelphia, Penn., and will be of the same high quality as those produced in the Detroit plant of the national corporation, having to an equal degree the desirable characteristics of economy, lightness and nailability, and the acoustical and insulating qualities for which Straub patented products are so justly noted.

"Owing to adequate facilities and the favorable location of the Flint plant, we are able to deliver cinder concrete and Weldcrete units at prices that will render them highly desirable from the standpoint of economy, as compared with costs of ordinary building materials in the northern district. As the line of sand concrete units is somewhat in the nature of an added service to customers of the General Cement Products Corp., we have attempted and believe we have succeeded in turning out a highly superior product, at prices that are extremely reasonable in view of the quality.

"Deliveries of building units will be made by motor truck to all points in Flint, Saginaw, Bay City, Port Huron, Lapeer, Owosso and districts surrounding. Rail deliveries, f.o.b. car, will be made at all points beyond the range of truck delivery. Prompt service is available because of fully adequate trucking facilities and rail provision at our plant."—*Detroit* (Mich.) *Manufacturers' Financial Record.*

F. D. Coppock on Important National Resources Committee

F. D. COPPOCK, president of the American Aggregates Corp., Greenville, Ohio, and a member of the board of directors of the National Sand and Gravel Association, has been requested by William Butterworth, president of the Chamber of Commerce of the United States, to serve as a member of the chamber's committee on natural resources.

Among the other members of this committee are Matthew S. Sloan, president of the New York Edison Co., New York; William G. Skelly, president, Skelly Oil Co., Tulsa, Okla., and John C. Merriam, president of the Carnegie Institution, Washington, D. C. Mr. Coppock's appointment to this important committee comes as a signal honor to one of the most active men in the development of the natural resources of the country.—*National Sand and Gravel Bulletin.*

National Crushed Stone Directors to Meet at Atlantic City

ON JULY 25 AND 26 the board of directors of the National Crushed Stone Association will convene at the Ambassador Hotel, Atlantic City, for its semi-annual meeting in response to a call recently issued by President W. F. Wise, of Dallas, Tex.

One of the most important matters to come before the board is the selection of the city and hotel for the fourteenth annual convention of the association to be held next January. Among those from which the selection will probably be made are St. Louis, Pittsburgh, Memphis and Washington.

Cement Industry Cited for Sales Promotion Efforts

THE EDUCATIONAL WORK of the Portland Cement Association in developing new markets for concrete is held up as an example to other industries in an interesting article appearing in the July 10 issue of *Printers Ink* by Arthur H. Little.

The story outlines the work being done by the cement association field men combined with the advertising being carried in farm and other journals and goes on to say that "the kind of educational work that has been conducted in behalf of portland cement is the kind that, figuratively—and in some instances, quite literally—goes back to the grass roots. It is the kind that, without overlooking the major and logical and wholly obvious markets for a product, is keenly alert for new markets. It is the kind that will spend money over a stretch of years to develop business, not only in the major markets, but in the undeveloped markets in which business actually must be created."

Talc Is Being Sought by Several New Firms, Says State Geologist

STIMULATION of interest in talc production has been one of the recent features in the mineral field in North Carolina. Four new companies have entered the prospecting and production field.

Two of the companies, the Georgia Talc Co., and Binney & Smith are in Cherokee county; the North Carolina Talc and Mining Co., in Swain county; and Craig L. Rudisill Talc Co., in Madison county.

According to State Geologist H. J. Bryson, the Madison county firm has erected a plant at Marshall and is producing talc, soapstone, and chalk crayon.

North Carolina, says State Geologist Bryson, has been the leading producer of talc, but the output has slumped during the last few years.

In 1929, the production amounted to approximately 12,000 tons with a value close to $100,000. One of the largest producers is the Standard Mineral Co., at Hemp, which produces pyrophyllite.

New Cement Plant Projected for St. Louis, Mo.

THE ST. LOUIS PORTLAND CEMENT CO., St. Louis, Mo., just organized, will start work within the next month on a $2,000,000 cement plant, E. S. Tompkins, assistant director of the Industrial Bureau of the Industrial Club of St. Louis, announced July 3.

While the exact location of the plant will not be determined for several days, it is to be in the St. Louis industrial district, Mr. Tompkins said. It will have a daily capacity of 4000 bbl. and employ 150 persons at the outset. Two kilns, each 200 ft. long and 11 ft. in diameter, are to be constructed. Cement is to be manufactured by what is known as the wet process, which means grinding the materials wet and feeding the mixture directly into the furnace without drying.

The company also will open a large stone quarry and crusher for commercial operations.

C. Boettcher of Denver, Colo., is president of the newly organized concern. Other officers are C. D. Nichols, Oklahoma City, vice-president; R. J. Morse, Denver, secretary and general manager, and M. O. Matthews, Ada, Okla., treasurer. Mr. Boettcher also is president of the Ideal Cement Co., of Denver.

Decision to organize the company and erect the plant in St. Louis, it is said, is due to a belief that St. Louis is to become one of the foremost industrial centers of the nation within the next few years. Its central location, adequate and ideal transportation facilities and nearness to raw materials also are said to have influenced the decision to build a $2,000,000 plant here. This plant will serve several states within a radius of approximately 300 miles of St. Louis.—*St. Louis* (Mo.) *Globe-Democrat.*

Missouri Portland Cement Officers View Tulsa Project

THAT TULSA (Okla.) offers most excellent facilities for the successful operation of a cement plant, both from the standpoint of materials and a ready market for the product, was asserted yesterday by H. L. Block, president of the Missouri Portland Cement Co., St. Louis, Mo., who with a group of company officials spent the day here inspecting the site of the plant they propose to construct near Dawson and meeting the business men of Tulsa with whom they expect to soon become more closely affiliated.

The party arrived here early in the morning and returned to St. Louis at night. It included, in addition to Mr. Block, Hiram Norcross, vice-president and general manager; F. B. Coleman and C. A. Homer, vice-presidents; V. P. Bogy, C. W. Johnson, C. H. A. Lemp and Harold M. Bixby, directors; E. M. Stevens, chief engineer; G. A. Saeger, chemical engineer; P. C. Blaise, general superintendent, and M. Moss Alexander, sales manager.

Accompanied by C. L. Dewey and Chamber of Commerce officials and directors, the group visited the proposed sites during the morning and following a dinner at the Mayo hotel was host to scores of Tulsa citizens who visited their headquarters and extended the welcoming hand.

"We cannot state definitely just when we can break ground on the plant," Mr. Norcross stated. "There are so many details to be taken into consideration in locating such an institution. But the tests so far made are so satisfactory that there is no question but that we will have the plant in operation within 12 months at least. It will require about eight months' time to complete the building and install equipment after we break ground."

It was explained that on the properties held by the company under option very little stone is exposed which necessitates core drilling to determine thickness and quality. Cement is manufactured upon such a close margin that a mere saving of one-half a cent a barrel is worthy of consideration. As the finished product consists of 85% limestone and 15% shale, the relativity of these two ingredients on a location also must be taken into account. It may require from four to six weeks longer before a definite decision as to exact location can be made.

The proposed Tulsa plant will have a capacity of 1,000,000 bbl. of cement a year, being the same size as the plant operated by the company in Kansas City, larger than one of the plants in St. Louis and about half the size of the second plant there. It will represent an investment of $2,500,000.

The Tulsa plant will be the last word in cement plant construction, according to G. A. Saeger, chemical engineer. It will be absolutely dustless. Instead of several smaller crushers one large one will be used which will do the crushing in one operation. The closed-circuit grinding system will be installed.

Market for the product of the Tulsa plant is available in Oklahoma, Arkansas and northern Texas and the Texas panhandle. In Oklahoma alone, according to M. Moss Alexander, sales manager, the state uses 3,000,000 bbl. annually for state highway improvement and in addition cities and companies use 2,000,000 bbl. more. There are two other plants in the state, the Oklahoma Portland Cement Co. plant at Ada and the Dewey Portland Cement Co. plant at Dewey. The combined capacity of these plants is about 3,000,000 bbl. annually.—*Tulsa* (Okla.) *World.*

Find Lime in Baltics

SHELL lime with pure lime below has been discovered in a heavy and extensive deposit near Jagutten in the Memel district on the Baltic Sea.

Marquette Cement to Increase St. Louis Facilities

R. W. MEYER, local manager of the Marquette Cement Manufacturing Co. at St. Louis, Mo., announced on July 15 plans for construction of an addition to its distributing plant and docks here involving an expenditure of approximately $75,000. The work for which bids are now being taken includes five reinforced concrete silos for the storage of cement which will more than double the present storage capacity of the plant.—*Chicago Journal of Commerce.*

Los Angeles Rock and Gravel Co. Reopens Pit at Arroyo Seco

PLANNING EVENTUALLY to come all the way up the Arroyo Seco to the south end of Victory Park No. 1 at South Avenue 57, the Los Angeles Rock & Gravel Co. recently put an electric shovel to work on its gravel holdings.

Officials of the company said they planned to go down approximately 15 ft. with the cut and more if the deposit warrants. Tests made recently show that the deposit runs as deep as 30 and 40 ft.

The gravel dug out recently was the first turned over above Avenue 45 in two years. Injunction proceedings brought by the city halted excavating work in 1928, but on appeal to the supreme court the gravel company obtained permission to excavate provided no water pits were left and no steam shovels were employed.

In view of the pending proceedings for condemnation of the Arroyo bed for Victory Park No. 2, the gravel company, although permitted by the supreme court to excavate, nevertheless had confined its operations since then to the lower portion.

However, now that court proceedings have been started to void the city's acquisition of the Arroyo for park purposes, the gravel company intends to take advantage of the delay and remove the deposits from those of its holdings which the city has under condemnation.—*Highland Park* (Calif.) *News-Herald.*

Recent Contract Prices

SALEM, ORE.—Four bids were placed for cement by local concerns for city pavement work, but no award was made. Each firm bid $3.18 per bbl. Companies asking for the material awards were the Gabriel Powder and Supply Co., the C. K. Spaulding Logging Co., the Oregon Gravel Co. and the Salem Sand and Gravel Co.

Price of the Oregon Gravel Co. for sand was $1.70 a yard, $1.20 a yard for gravel and $1.70 to $2.20 a yard for concrete gravel. The Salem Sand and Gravel Co. bid $1.15 a yard for sand, $1.60 a yard for gravel and $1.65 and upwards a yard for concrete gravel.—*Salem* (Ore.) *Statesman.*

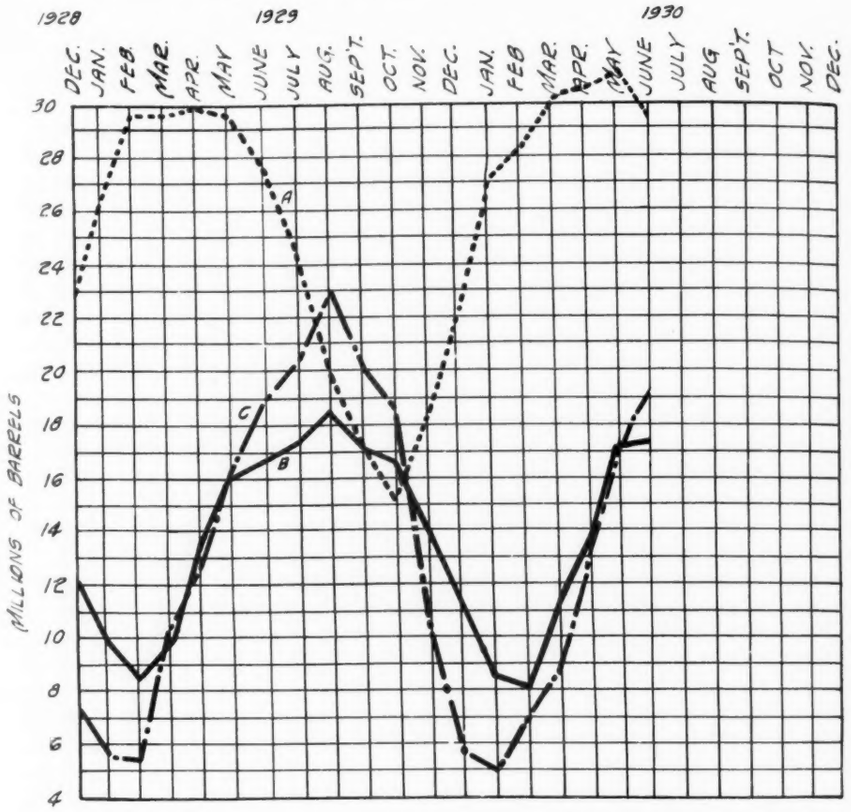
Portland Cement Output in June

Increase in Production—Slight Decrease in Sales

THE PORTLAND CEMENT industry in June, 1930, produced 17,237,000 bbl., shipped 18,780,000 bbl. from the mills and had in stock at the end of the month 29,348,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in June, 1930, showed an increase of 2.6% and shipments a decrease of 0.9% as compared with June, 1929. Portland cement stocks at the mills were 6.7% higher than a year ago. The total production for the first half of 1930 amounts to 75,892,000 bbl., compared with 75,076,000 bbl. in the same period of 1929, and the total shipments for the first half of 1930 amount to 70,137,000 bbl., compared with 70,248,000 bbl. in the same period of 1929. The statistics here presented are compiled from reports for June, from all manufacturing plants except three, for which estimates have been included in lieu of actual returns. In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 166 plants at the end of June, 1930, and of 163 plants at the end of June, 1929. In addition to the capacity of the new plants which began operating during the 12 months ended June 30, 1930, the estimates include increased capacity due to extensions and improvements at old plants during the period.

RELATION OF PRODUCTION TO CAPACITY

	June 1929	June 1930	May 1930	April 1930	Mar. 1930
	Pct.	Pct.	Pct.	Pct.	Pct.
The month	80.9	81.4	78.9	64.0	51.5
12 months ended	69.0	66.4	66.2	66.0	66.1



(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during April and May, 1929 and 1930:

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN APRIL AND MAY, 1929 AND 1930, IN BARRELS*

Shipped to	1929—April—1930		1929—May—1930	
Alabama	166,925	126,501	172,938	129,594
Alaska	1,778	2,988	1,641	2,068
Arizona	51,150	45,312	57,318	41,429
Arkansas	99,392	130,247	98,331	131,701
California	973,052	824,463	977,113	877,635
Colorado	99,991	85,644	106,513	109,098
Connecticut	158,992	184,816	202,140	211,543
Delaware	31,219	32,573	35,091	38,168
District of Columbia	97,218	82,913	109,581	96,091
Florida	101,227	104,898	105,045	104,418
Georgia	139,353	139,155	121,684	135,715
Hawaii	24,308	26,240	32,262	29,558
Idaho	26,923	25,650	35,169	22,081
Illinois	1,069,018	694,367	1,583,290	1,038,904
Indiana	365,104	386,945	474,599	637,605
Iowa	215,629	447,570	579,190	1,067,232
Kansas	285,944	283,917	258,378	270,178
Kentucky	163,059	118,156	146,423	122,507
Louisiana	105,290	374,620	121,576	311,868
Maine	34,197	64,470	56,851	79,871
Maryland	169,575	257,033	235,589	331,582
Massachusetts	226,181	320,443	303,692	325,910
Michigan	785,443	599,371	1,192,634	1,022,121
Minnesota	220,077	248,088	348,850	501,896
Mississippi	76,425	42,812	79,718	44,775
Missouri	405,208	529,829	436,246	734,806
Montana	49,313	37,562	76,909	37,558
Nebraska	106,392	153,348	140,036	164,983
Nevada	10,848	15,637	16,672	15,133
New Hampshire	42,946	45,594	70,122	66,250
New Jersey	689,358	623,867	890,487	712,665
New Mexico	33,100	35,730	28,894	32,693
New York	1,598,671	1,556,095	2,130,573	2,032,025
North Carolina	224,791	141,565	222,453	133,974
North Dakota	62,207	39,253	58,414	43,316
Ohio	849,359	823,451	990,025	1,091,994
Oklahoma	309,739	381,939	270,643	364,053
Oregon	79,593	72,861	94,249	89,175
Pennsylvania	960,745	1,088,646	1,296,266	1,559,467
Porto Rico	975	1,300	300	5,265
Rhode Island	65,457	73,396	80,975	87,710
South Carolina	131,517	81,105	139,561	80,910
South Dakota	40,519	36,414	54,123	51,745
Tennessee	231,259	236,120	248,286	229,121
Texas	694,150	713,051	622,377	583,004
Utah	46,663	53,292	67,602	54,023
Vermont	33,872	32,457	83,862	55,676
Virginia	176,266	148,622	190,663	182,283
Washington	255,250	276,475	208,716	324,551
West Virginia	93,098	120,687	115,718	175,547
Wisconsin	352,986	299,210	633,405	564,324
Wyoming	12,491	15,870	20,364	18,818
Unspecified	20,771	14,500	0	13,660
	13,265,014	13,297,068	16,623,557	17,188,277
Foreign countries	59,986	42,932	82,443	35,723
Total shipped from cement plants	13,325,000	13,340,000	16,706,000	†17,224,000

*Includes estimated distribution of shipments from three plants in April and May, 1929; from two plants in April and May, 1930.
†Revised.

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1929 AND 1930, IN BARRELS

Month	1929—Production—1930		Stock at end of month 1929	1930
January	12,012,000	10,504,000	9,642,000	9,646,000
February	11,255,000	10,008,000	12,436,000	11,572,000
March	12,450,000	13,045,000	14,948,000	13,503,000
April	14,166,000	15,025,000	15,479,000	15,164,000
May	15,444,000	*16,607,000	14,911,000	*14,668,000
June	15,312,000	15,921,000	13,587,000	13,603,000
July	15,214,000		11,619,000	
August	15,829,000		8,995,000	
September	15,165,000		7,009,000	
October	15,515,000		5,934,000	
November	14,087,000		6,134,000	
December	12,539,000		7,526,000	

*Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JUNE, 1929 AND 1930, AND STOCKS IN MAY, 1930, IN BARRELS

District	Production 1929—June—1930		Shipments 1929—June—1930		Stocks at end of month 1929	1930	Stocks at end of May, 1930
Eastern Penn., N. J., Md.	3,697,000	3,397,000	4,201,000	3,903,000	5,852,000	6,493,000	6,998,000
New York and Maine	1,197,000	1,271,000	1,383,000	1,381,000	2,009,000	1,737,000	1,847,000
Ohio, West'n Penn., W. Va.	1,885,000	1,924,000	2,046,000	2,119,000	3,578,000	3,908,000	4,102,000
Michigan	1,466,000	1,487,000	1,720,000	1,459,000	2,469,000	2,813,000	2,785,000
Wis., Ill., Ind. and Ky.	2,305,000	2,336,000	2,706,000	2,552,000	3,650,000	4,591,000	4,808,000
Va., Tenn., Ala., Ga., Fla., La.	1,279,000	1,316,000	1,285,000	1,180,000	2,111,000	2,001,000	1,865,000
East'n Mo., Ia., Minn., S. D.	1,607,000	1,987,000	2,123,000	2,412,000	3,745,000	3,203,000	3,628,000
Western Mo., Neb., Kansas, Okla. and Ark.	1,089,000	1,322,000	1,126,000	1,404,000	1,492,000	1,725,000	1,807,000
Texas	554,000	558,000	579,000	706,000	510,000	688,000	836,000
Colo., Mont., Utah, Wyo., Ida.	325,000	300,000	336,000	296,000	506,000	566,000	563,000
California	1,110,000	953,000	1,113,000	950,000	995,000	1,079,000	1,077,000
Oregon and Washington	289,000	386,000	331,000	418,000	588,000	544,000	575,000
	16,803,000	17,237,000	18,949,000	18,780,000	27,505,000	29,348,000	30,891,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1929 AND 1930, IN BARRELS

Month	1929—Production—1930		1929—Shipments—1930		Stocks at end of month 1929	1930
January	9,881,000	8,498,000	5,707,000	4,955,000	26,797,000	27,081,000
February	8,522,000	8,162,000	5,448,000	7,012,000	29,870,000	28,249,000
March	9,969,000	11,225,000	10,113,000	8,826,000	29,724,000	30,648,000
April	13,750,000	13,521,000	13,325,000	13,340,000	30,151,000	30,867,000
May	16,151,000	*17,249,000	16,706,000	*17,224,000	29,624,000	*30,891,000
June	16,803,000	17,237,000	18,949,000	18,780,000	27,505,000	29,348,000
July	17,315,000	.....	20,319,000	.....	24,525,000	.....
August	18,585,000	.....	23,052,000	.....	20,056,000	.....
September	17,223,000	.....	19,950,000	.....	17,325,000	.....
October	16,731,000	.....	18,695,000	.....	15,381,000	.....
November	14,053,000	.....	11,222,000	.....	18,213,000	.....
December	11,215,000	.....	5,951,000	.....	23,550,000	.....
	170,198,000	.....	169,437,000	.....	.....	.....

*Revised.

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN JUNE, 1929 AND 1930, IN BARRELS

District	1929—Production—1930		Stocks at end of month 1929	1930
Eastern Pennsylvania, New Jersey and Maryland	3,397,000	3,270,000	2,631,000	2,398,000
New York and Maine	1,045,000	1,124,000	1,249,000	850,000
Ohio, Western Pennsylvania and West Virginia	1,683,000	1,854,000	1,636,000	1,704,000
Michigan	1,242,000	1,241,000	1,167,000	1,613,000
Wisconsin, Illinois, Indiana and Kentucky	2,023,000	2,099,000	2,084,000	2,316,000
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	1,195,000	1,222,000	1,152,000	980,000
Eastern Missouri, Iowa, Minnesota and South Dakota	1,457,000	1,776,000	1,024,000	1,037,000
Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas	1,036,000	1,282,000	705,000	417,000
Texas	587,000	485,000	228,000	315,000
Colorado, Montana, Utah, Wyoming and Idaho	319,000	321,000	528,000	206,000
California	1,052,000	924,000	878,000	1,243,000
Oregon and Washington	276,000	323,000	575,000	524,000
	15,312,000	15,921,000	13,587,000	13,603,000

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1929 AND 1930

Month	1929—Exports—1930 Barrels	Value	Barrels	Value	1929—Imports—1930 Barrels	Value	Barrels	Value
January	78,639	$283,002	82,387	$293,135	151,302	$177,976	201,609	$207,461
February	58,886	225,590	64,267	217,798	118,930	123,123	114,455	119,717
March	69,079	235,164	117,563	357,896	131,909	112,788	43,622	59,981
April	64,145	218,316	57,419	200,217	89,668	114,281	140,871	178,226
May	57,955	219,366	57,423	198,170	200,646	267,854	94,696	111,998
June	96,055	287,612	.....	.....	203,545	228,170	.....	.....
July	71,992	247,177	.....	.....	182,098	199,960	.....	.....
August	60,013	225,762	.....	.....	183,938	199,403	.....	.....
September	86,268	308,631	.....	.....	112,372	152,239	.....	.....
October	101,359	337,839	.....	.....	172,566	187,504	.....	.....
November	53,378	198,197	.....	.....	96,568	95,844	.....	.....
December	88,403	297,255	.....	.....	84,358	79,098	.....	.....
	886,172	$3,083,911	.....	.....	1,727,900	$1,938,240	.....	.....

Exports and Imports

These figures were compiled from the records of the Bureau of Foreign and Domestic Commerce and are subject to revision.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN MAY, 1930

Exported to	Barrels	Value
Canada	7,761	$32,690
Central America	4,200	10,627
Cuba	7,136	20,050
Other West Indies	2,690	5,185
Mexico	10,444	32,490
South America	20,318	64,950
Other countries	4,874	32,178
	57,423	$198,170

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN MAY, 1930

Imports from	District into which imported	Barrels	Value
Belgium	New York	2,500	$2,699
	Porto Rico	3,005	4,000
	Total	5,505	$6,699
Canada	Me. and N. H.	199	$461
Denmark	New York	10,000	$10,450
	Porto Rico	15,800	22,583
	Total	25,800	$33,033
United K'gd'm	New York	12,025	$12,219
	Philadelphia	51,167	59,586
	Total	63,192	$71,805
	Grand total	94,696	$111,998

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN MAY, 1930

	Barrels	Value
Alaska	4,142	$11,860
Hawaii	19,930	48,250
Porto Rico	1,300	2,392
	25,372	$62,502

Retail Prices of Various Rock Products Materials

THE TABLE below gives average prices paid June 1, 1930, by contractors for various rock products, delivered on the job at different principal cities of the United States. These prices were secured through the Bureau of Census.

AVERAGE RETAIL PRICES FOR ROCK PRODUCTS MATERIALS, JUNE 1, 1930

City	MATERIAL: Portland cement, per bbl., exclu. of cont.	Gypsum wallboard, ⅜-in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
New Haven, Conn.	$2.90	.....	.....	$1.50	$2.25	.....
New London, Conn.	2.80	$25.00	$26.00	1.50	3.00	$18.00
Waterbury, Conn.	3.00	30.00	20.00	1.35	2.45	20.00
Haverhill, Mass.	2.70	25.00	20.00	.....	4.00	18.50
New Bedford, Mass.	2.60	25.00	18.50	1.75	3.00	17.50
Albany, N. Y.	2.97	24.75	18.00	.....	.....	17.10
Buffalo, N. Y.	3.10	25.00	18.00	2.50	2.05	14.00
Rochester, N. Y.	3.25	22.00	22.00	2.50	2.40	17.00
Syracuse, N. Y.	3.00	22.50	.....	2.00	2.00	17.00
Poughkeepsie, N. Y.	2.04	.....	.....	2.25	2.20	.....
Paterson, N. J.	2.60	.....	14.00	1.75	1.90	17.50
Trenton, N. J.	2.40	26.00	18.00	1.50	2.10	17.50
Philadelphia, Penn.	2.30	.....	15.50	1.85	2.65	19.75
Scranton, Penn.	2.80	.....	20.00	3.25	.....	19.00
Baltimore, Md.	2.40	.....	13.00	2.00	2.75	16.00
Washington, D. C.	2.65	25.00	14.00	.....	.....	17.00
Richmond, Va.	3.10	31.00	17.50	1.95	2.45	20.00
Fairmount, W. Va.	2.80	35.00	16.00	3.15	3.50	18.00
Winston-Salem, N. C.	2.80	.....	14.00	1.50	3.50	16.00
Columbia, S. C.	.....	.....	.....	1.25	.....	17.50
Atlanta, Ga.	3.25	.....	21.00	2.50	3.25	20.00
Savannah, Ga.	2.25	25.00	20.00	1.75	5.50	16.00
Tampa, Fla.	2.60	.....	20.00	2.00	4.00	20.00
Shreveport, La.	3.60	.....	.....	2.00	4.75	22.00
Erie, Penn.	2.40	22.50	19.00	2.25	.....	16.00

City	MATERIAL: Portland cement, per bbl., exclu. of cont.	Gypsum wallboard, ⅜-in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
Akron, Ohio	$2.67	.....	$18.00	$1.85	$3.00	.....
Cincinnati, Ohio	2.94	24.75	16.40	2.63	2.55	.....
Toledo, Ohio	3.00	25.00	.....	2.25	2.75	15.00
Cleveland, Ohio	2.80	.....	16.00	1.95	2.70	15.50
Columbus, Ohio	2.75	23.00	17.50	2.25	2.50	15.00
Youngstown, Ohio	2.95	.....	20.00	3.71	2.75	.....
Detroit, Mich.	2.60	21.00	14.80	2.75	3.00	.....
Lansing, Mich.	2.75	.....	22.00	2.25	2.25	16.00
Terre Haute, Ind.	3.00	28.00	18.00	1.65	3.50	20.00
Louisville, Ky.	2.52	.....	15.50	.....	2.43	16.00
Chicago, Ill.	2.00	.....	13.50	1.95	2.00	.....
Milwaukee, Wis.	2.60	25.00	16.00	2.00	2.00	18.00
Saginaw, Mich.	2.40	25.00	18.00	2.50	3.25	17.00
Des Moines, Iowa	2.66	23.75	20.00	1.60	3.60	10.00
Kansas City, Mo.	2.50	25.00	.....	1.88	1.80	15.00
St. Louis, Mo.	2.45	.....	18.00	2.09	1.50	18.00
St. Paul, Minn.	2.75	21.00	21.00	1.40	2.00	16.00
Grand Forks, N. D.	2.80	25.00	.....	2.60	.....	16.00
Sioux Falls, S. D.	3.00	.....	24.00	1.25	2.25	15.00
Denver, Colo.	3.20	27.00	23.00	1.75	1.60	18.00
San Antonio, Texas	2.60	37.00	20.00	2.10	2.35	18.15
Tucson, Ariz.	3.17	45.00	30.00	1.25	2.00	17.50
Long Beach, Calif.	1.76	34.00	26.00	1.95	2.20	17.50
Los Angeles, Calif.	1.72	34.00	24.00	1.00	1.30	17.50
San Francisco, Calif.	2.42	.....	22.50	1.40	1.60	18.50
Seattle, Wash.	1.50	35.00	22.00	1.40	.....	20.00

New Jersey May Build Sidewalks Along State Roads

ACT No. 74, New Jersey Laws of 1930, is its commonplace name, but it carries with it something of significance to every person in this country who walks.

The gist of the law is that New Jersey's state highway commission may build sidewalks along state highways. This is the first noteworthy recognition given in recent years to that part of society known as the pedestrian, that person who is continually being killed and maimed along public thoroughfares.

Two other states, Delaware and West Virginia, have made such provisions, according to a recently conducted survey to which 36 states replied. Only about a third of the states have provisions for permitting towns and counties to build country walkways even at their own expense.

It is quite apparent that on the whole there is a tendency to overlook that people are still required to walk along the public highway. But considerable walking is still being done; Delaware reports that in the period from 1924 to 1929, 83 pedestrian accidents occurred in the state. This is 36% of accidents of all types in Delaware outside of Wilmington.

A glance at highways leading into towns and cities, or highways passing rural schools, will reveal that walking is not a lost art. In fact it is very much of an art for where no walking provisions have been made pedestrians are forced to walk along the pavement's edge, or on the abutting shoulder, with the expectation of jumping into ditches and brambles most any moment.

Edward N. Hines, well known road leader of the Detroit area, recently declared, "I am a firm believer that pedestrian walks along heavily traveled roads are absolutely necessary, and while the time may not be ripe for carrying this out on a major scale, the time is surely coming when all such roads will be supplemented by walkways."

Waste Phosphatic Sands Yield Commercial Concentrate

A LABORATORY INVESTIGATION of gravity concentration of phosphatic sands now rejected as waste by washing plants in Florida has shown the feasibility of recovering 35 to 45% of the phosphate content of the waste sands treated in a concentrate above the minimum commercial grade—66% bone phosphate of lime—now regularly marketed in the Florida fields. This work has been conducted by the United States Bureau of Mines, Department of Commerce, in co-operation with certain operators in Florida, the Missouri School of Mines and Metallurgy, and the University of Alabama. Significant as are these savings, utilization of products analyzing less than 66% bone phosphate of lime would lead to still larger conservation. It is entirely within the field of probability that such reductions will take place in the coming years.

Commercial applications of gravity concentration methods have been undertaken in the Florida land-pebble district by one company. A second concern is now investigating the commercial possibilities of this process and others may consider its application to their own operations. Such a change in methods is to be encouraged inasmuch as the conservation of the nation's resources of phosphate, due to the increased recoveries of the mineral content of the ores mined, will result from the application of these methods to the beneficiation of materials now passing to waste.

Mexico Constructs Plant to Produce Carbon Dioxide

A NEW plant for the production of solid carbon dioxide is being constructed near Tampico, Mexico, by an American oil company, according to a report received in the Department of Commerce from Commercial Attache George Wythe, at Mexico City.

The capacity of the plant is about 20 tons per day, and the bulk of the output is to be used for operators of refrigerator cars in the United States and the balance for local use. The smaller bulk and other alleged advantages over ordinary ice apparently led to this undertaking. From Tampico to Chicago about 10 tons of water ice are required per car, compared to 0.6 ton of carbonic ice.

Gas for this product is to be obtained from some of the American company's properties, from which the supply is ample.

Improving Acoustics in Old as Well as New Public Buildings

EVIDENTLY it is not necessary to await the construction of new buildings to sell acoustical plaster—especially in a case where "Better Acoustics Will Lessen Din as Solons Orate," as the *Atlanta* (Ga.) *Constitution* heads the following article:

"Followers of Georgia's legislative activities may expect at future assembly sessions to hear the voices of their favorite orators clearly and distinctly, instead of being assailed by the confused jumble of sound that has reverberated through the house and senate chambers at times in years past.

"This, at any rate, is the guarantee of the United States Gypsum Co., which was awarded the contract recently for improving acoustical conditions in the state capitol.

"The problem confronting the technical experts of the company, expressed in a layman's terms, is to place in the legislative halls a surface that will absorb a large part of the sound rather than throw it back to collide with succeeding sounds. An analysis of the present situation in the senate and house chambers has revealed that the plaster ceilings absorb only 3% of the sound waves striking upon them, while the other 97% rebound and mingle with following syllables, in the case of a speech, to such an extent that only an unpleasant noise results.

"The means of improving this condition is a kind of tile made from what is known in trade circles as 'rock wool.' The wool is mixed with water, gypsum plaster and other ingredients and baked again into various forms, somewhat in the manner of bricks, although at a much lower temperature.

"Officials of the gypsum company here said their tests had determined that it will be necessary to cover only the ceilings of the senate and house chambers with the tile, which is installed by cementing it to the rough plaster."

Byproducts of Rock-Dusting Coal Mines

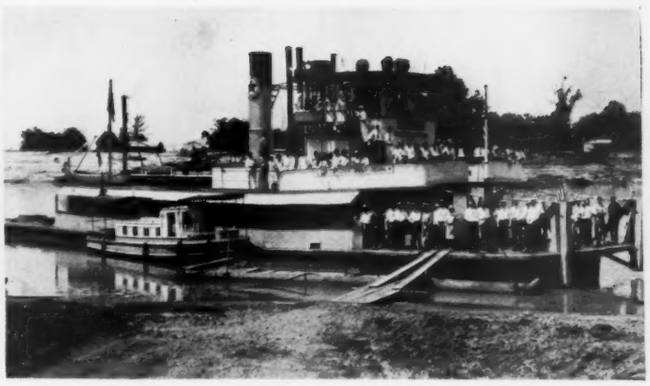
(An Editorial in *Coal Age*)

NOW THAT ROCK-DUSTING has come to stay, doubtless a number of uses will be found for it besides that of extinguishing mine explosions, and of stemming and safeguarding shots. Prominent among these will be fighting fire. A rock-dusting machine can advance on a small fire and coat the ribs with inert dust till the fire goes out, and it can do this without destroying the roof, as the vapor from water would do, and without generating the highly combustible hydrogen or in any large degree, the poisonous, though less combustible, carbon monoxide. In short, by putting rock dust on a fire the generation of water gas is avoided.

Rock dust not only acts as a fire-fighting tool but protects the mine against the possibility of fire. It whitens and, therefore, lightens the roadways; it protects the ribs and roof against deterioration, and by filling up crevices in the coal reduces air leakage between headings. Electrical fires can be subdued by it with less injury to the equipment than by sand. It is quite probable that, sprinkled on such mine ribs as are subject to spontaneous combustion, it will greatly reduce that tendency. Moreover, if limestone dust is used, it has some effect, however inadequate, in the neutralization of the acid waters. Its effect on the transmission of fungus growths from timber to timber and on the development of the spores should they reach the timber is a matter that has not been investigated.

George S. Rice, chief engineer, U. S. Bureau of Mines, first to advocate the use of rock dust in this country, builded better than he knew. Coal men are only just beginning to learn what rock dust will do. Probably its introduction would have been delayed long, if not forever, had it served only these minor uses, but once installed its byproducts have become manifest.

Members of the Lone Star New Orleans safety committee who made splendid record



Lone Star towboat "Incor" which conveyed the guests to St. Stephens celebration

More Plants Dedicate Safety Trophies

Notable Celebrations Together with Regional Meetings Do Much to Promote Safety Movement

TWO MORE of the very interesting series of celebrations held for the purpose of dedicating Portland Cement Association safety trophies took place on Thursday, June 19, at the St. Stephens, (Ala.), quarry of the Lone Star Cement Co., Louisiana, and on Saturday, June 21, at the New Orleans mill of the same company.

The St. Stephens celebration was given in recognition of a perfect safety record of 26 months at the quarry, which serves the New Orleans mill and, therefore, is considered by the association as a part of the New Orleans plant. Had the quarry suffered an accident, the point that it is located many miles from the mill would not have prevented the counting of the accident against the plant record. As the St. Stephens employes do not get to New Orleans, company officials decided that the former should have a celebration at St. Stephens and that a bronze tablet should be placed there.

Party at St. Stephens

As many of the St. Stephens employes live at Jackson, Ala., the company arranged to have guests from various points travel by rail to Jackson where employes and guests boarded the company's steel towboat Incor on the Tombigbee River for an hour's trip to St. Stephens.

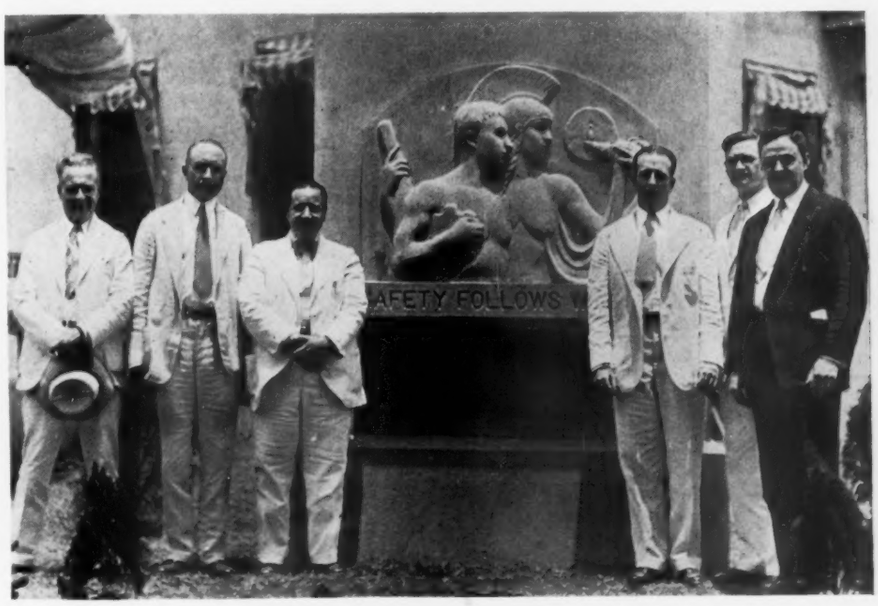
Arriving at the quarry the party landed and assembled around a gayly decorated speakers' stand located in the park adjacent to the plant buildings. A. D. Stancliffe, general superintendent of southern plants of the International Cement Corp., acted as master of ceremonies, introducing the various speakers of the occasion. The first was A. J. R. Curtis of the Portland Cement Association, who briefly outlined the conception of safety in the industry and the remarkable results obtained through its application. In conclusion Mr. Curtis dedicated the bronze tablet commemorating the safe record of the quarry and crusher departments.

Betty McCrary, daughter of Dr. G. C. McCrary, plant surgeon, and Elliott Raybon, daughter of Henry Raybon of the crew of the towboat Incor, pulled the cords which unveiled the bronze plate bearing the following inscription:

"This tablet is placed in recognition of cooperation in the successful effort of the Lone Star Cement Company, Louisiana, to merit the Portland Cement Association safety trophy for 1929."

F. W. Morris, quarry superintendent, accepted the marker with an appropriate speech. E. Posselt, vice-president of the International Cement Corp., New York, was then introduced. Mr. Posselt stressed the importance of safety to industy to the end that life, health and machinery be conserved. Scott Thompson, vice-president of the Lone Star Cement Co., Louisiana, and I. C. Brotzman, plant superintendent, then spoke briefly along similar lines. The last speaker was Circuit Judge T. J. Bedsole, one of the best known orators of southern Alabama.

The crowd adjourned to a nearby grove where a splendid picnic dinner was served, consisting of fried chicken, fried fish, home made sandwiches, cakes and pies, and soft drinks. The events of the afternoon included tug of war, between colored employes of quarry and crusher; greased pole climb; sack races, potato race, and other humorous events. There was dancing and jigging by



Officials grouped around trophy at St. Stephens

Brass tablet unveiled by daughters of employes to commemorate safety record at St. Stephens quarry of the Lone Star Cement Co., Louisiana

the colored employes and a watermelon eating contest.

New Orleans Celebration

The celebration accompanying the dedication of the safety trophy at the New Orleans plant proved an unusual occasion in several respects. A. D. Stancliffe again acted as master of ceremonies. The program, which began at 11 a. m. was as follows:

Invocation—Rev. P. M. H. Wynhoven, director of Catholic Charities and pastor of St. Joseph's Church, Gretna, La.

Presentation of Trophy—A. J. R. Curtis.

Unveiling of trophy by Mildred Mary Malouse and Rosemary Forster.

Acceptance of trophy, I. C. Brotzman, superintendent.

Address—E. Posselt, vice-president, International Cement Corp.

Address—W. Scott Thompson, vice-president, Lone Star Cement Co., Louisiana.

Address—Hon. Frank Gomilla, city commissioner.

After the dedication program an enjoyable picnic lunch was served, followed by a schedule of contests and games arranged for white employes and guests and a similar schedule for the colored employes.

Both St. Stephens and New Orleans celebrations proved so enjoyable that the employes have resolved to complete 1930 without mishap in order to have similar occasions one year hence. So far neither mill nor quarry has suffered a disqualifying accident during the present year.

Cleveland and Washington Meetings

INDICATIVE of the perpetual warfare against cement plant accidents waged by the Portland Cement Association, two important regional safety meetings were held, one on June 24 at Cleveland and the second on June 26 at Washington, D. C.

Ninety men representing twelve cement mills located in Ohio, Western New York and Western Pennsylvania attended the Cleveland meetings, of which W. L. White, Jr., general superintendent of the Medusa Portland Cement Co., acted as chairman. W. M. Powell, Medusa safety director, was in charge of local advance arrangements. The meeting was held in Hotel Cleveland. The program for the morning session, W. L. White, Jr., presiding, included an address of welcome by J. B. John, chairman of committee on accident prevention, Portland Cement Association; the annual report on safety work, by A. J. R. Curtis, secretary of the committee on accident prevention of the association; Relationship of the Sub-Normal Physical Risk to Industry, Dr. N. C. Yarian of the Cleveland Academy of Medicine; Safety, an Individual Responsibility, Municipal Judge L. E. Skeel, president of the Cleveland Safety Council. Discussion followed.

At the luncheon, E. J. Maguire, vice-president and treasurer of the Medusa Portland Cement Co., presided. An address, Safety Is Good Business, by Thomas P. Kearns, Superintendent, Industrial Commission of Ohio, Columbus, was the feature.

In the afternoon session, Leslie Davy, master mechanic, Lehigh Portland Cement Co., New Castle, Penn., presided, and a talk given by K. L. Marshall, associate mining engineer, U. S. Bureau of Mines, Pittsburgh, was followed by a paper: Safety Methods in Handling Explosives, by W. O. Dunn, technical representative, E. I. du Pont de Nemours and Co., Wilmington, Del., who showed motion pictures of manufacture and safe handling of explosives in quarry and other blasting, taken by the du Pont company. A first-aid demonstration by the prize winning team of the Ohio Public Service Co., concluded the meeting.

Washington Meeting

The Washington meeting, held at Hotel Raleigh, was attended by seventy men representing the five cement mills in the Chesapeake vicinity. John J. Porter, vice-president and general manager of the North American Cement Corp. acted as general chairman and was assisted by a committee consisting of A. R. Couchman, safety director, North American; vice chairman, Dwight F. Morgan, vice-president, Lone Star, Virginia; G. S. LaForge, superintendent, Lehigh, Union Bridge, Md.; E. S. Guth, district manager, North American, Hagerstown, and C. S. Aldinger, safety chairman, Medusa, York, Penn.

Although the day was warm the meeting was enthusiastic and the papers complete and instructive. The morning program included talks as follows: Cement Safety Work in 1929-30, A. J. R. Curtis, Portland Cement Association, Chicago; Winning a Safety Trophy, George F. Martinez, superintendent, Lone Star Cement Co., Norfolk, Va.; Good Housekeeping as an Aid to Safety, E. N. Woodward, quarry foreman, Lone Star Cement Co., Chuckatuck, Va.; What Part Does Good Housekeeping Have in Reducing Accidents? C. S. Aldinger, chief clerk, Medusa Portland Cement Co., York, Penn., and Gas Hazards and Protective Devices, L. K. Bowker, district manager, Mine Safety Appliances Co., Philadelphia.

Lieut. Col. H. A. Reninger, Lehigh, was chairman at the luncheon. Judge Theodore Risner, solicitor general, U. S. Dept. of Labor, was the speaker. In the afternoon

"O, O, now I done gone and lost dat gold toof of mine." And our "cullahed genman" knew from the wide grins of the spectators he would find sympathy in the dictionary. A scene taken at the Lone Star New Orleans celebration, diving for apples

session, A. R. Couchman, North American, presided.

Secretary Davis Speaks

Secretary of Labor Davis, who was delayed and failed to arrive for the luncheon, appeared just as the afternoon session had been called to order. He was enthusiastic and optimistic and appeared quite in his element among mill men. In opening his remarks, Secretary Davis said:

"Some of you may feel that you have come to Washington on a hot day, but whether it bothers you or not is largely a matter of viewpoint. I can remember some thirty years ago when I stood before a great steel furnace incomparably hotter than today's pleasant weather and felt most happy and grateful that I had a good job. The man who cultivates contentment of mind has found the real way to be happy.

"I am very glad that you men of the cement mills are keeping the human values uppermost in your minds. To prevent death, injury, discouragement or loss to the working men is just as necessary as it is that your mills be financially successful. Practice kindliness, watchfulness for those among whom you work and give your time to your job without reservation. By so doing you will succeed and the products of your success will be worth much more to you than money."

Speaking of the relief which cement mills in the coast states will receive from the new tariff bill, Secretary Davis said: "The new tariff bill should help the seaboard cement industry and put new life into it. It will go further than that. It will benefit the oil industry, the transportation industry, and the coal industry, the latter of which is in great need. Our highways of cement in the future will be not 20 ft. wide but 40 ft. or 60 ft. wide and a few years hence will solve the problem of congestion in our cities, for many of us will then find it practicable to live 40 miles or more away from the centers in which we work."

Secretary of Labor Davis' constant helpfulness to the cement mills in their accident prevention efforts through the last several years was favorably commented on after his departure from the meeting. When he resigns, as is expected, to become Senator from Pennsylvania, there is plenty of evidence that his assistance and the inspiration he has given to mill safety work would be greatly missed.

Papers presented during the morning and afternoon sessions covered the following subjects:

"The Foreman's Responsibility in Accident Prevention." C. S. Rogers, mill foreman, Lehigh Portland Cement Co., Union Bridge, Md.
"Instruction and Protection of New Employes." W. T. Law, master mechanic, Lehigh Portland Cement Co., Fordwick, Va.
"Medical Examination as an Aid to Safety." E. S. Guth, district manager, North American Cement Corp., Hagerstown, Md.
"How Safety Rules Should Be Enforced." Howard Gray, chief engineer, Lehigh Portland Cement Co., Union Bridge, Md.
"Protective Clothing and Devices as Aids to Safety." E. F. Alderton, superintendent, North American Cement Corp., Martinsburg, W. Va.
"Advantages of First Aid Training." J. H. Zaiser, operating engineer, North American Cement Corp., Hagerstown, Md.
"First Aid." D. Harrington, chief engineer, U. S. Bureau of Mines.

The first aid contest, which was the final feature of the afternoon program, was of particular interest because of the direction given by Daniel Harrington and J. J. Forbes, who are in charge of U. S. Bureau of Mines first aid and rescue activities.

Dwight Morgan of Norfolk presided at the dinner in a manner which added greatly to the pleasure of the occasion and Strickland Gillilan favored the assemblage with a spirited and instructive address. As a concluding feature, J. J. Forbes announced the results of the first aid contest which were as follows:

First Place: Berkeley Plant, North American Cement Corp., score 97½.

Second Place: Union Bridge Plant, Lehigh Portland Cement Co., score 96.

Third Place: Hagerstown Plant, North American Cement Corp., score 94¾.

Attendance at Cleveland

Bessemer Limestone and Cement Co., Bessemer, Penn., August Anderson, foreman, George Benson, shop foreman, A. J. Eales, safety director, Ivan Henderson, engineer, and Gust Oblum, laborer; Bessemer Cement Corp. (Federal), Buffalo, N. Y., Frank D. Bower.

Crescent Portland Cement Co., Wampum, Penn., Clark Ault, Ralph Barber, A. H. Brown, Henry Dodson, James Freed, Walter Gaffney, F. L. Herbert, Robert McKinnon, Mike Milkerlich, Paul Womac and W. P. Rice, superintendent.

Diamond Portland Cement Co., Middlebranch, Ohio, Albert Allison, T. M. Brown, Lee P. Glennan, chief electrician, George W. Herming, assistant superintendent, and Wilton Stull, foreman.

Great Lakes Portland Cement Co., Buffalo, N. Y., Thomas Sumner, foreman, Duke J. Thompson, assistant foreman, and J. B. Zook, chief engineer and safety director.

Lehigh Portland Cement Co., New Castle, Penn., Wesley Davy, mechanic; William H. Kleckner, superintendent, and Charles Schlicher, chief clerk.

Medusa Portland Cement Co., Cleveland, Ohio, Charles Jackson, assistant sales manager, R. B. McHenry, engineer, E. J. Maguire, vice-president, W. M. Powell, safety director, and W. L. White, Jr., general superintendent; Medusa, Bay Bridge, Ohio, Fred Krebs, trucking, A. J. Little, superintendent, Marson Martin, carpenter, L. Matthias, foreman, R. F. Moushay, foreman, John Mullaney, brickman, Irving Neuber, chemist, Henry Theil, foreman, Henry F. Trautlein, crane operator, and Paul Wolser, repair foreman; Medusa, Toledo, Ohio, A. C. Comstock, quarry foreman, William Edinger, night foreman, E. L. McGuire, yardmaster, Fred Hanson, machine shop foreman, L. Hassen, kiln room foreman, George Hartman, chief electrician, E. L. Juday, yard foreman, G. A. Roby, foreman, H. V. DeWolfe, chief engineer, and W. J. Worthy, superintendent.

Pittsburgh Plate Glass Co., Zanesville, Ohio, William E. Brucker, foreman, James T. Couper, packing and loading foreman, Harold F. Gries, millwright, Francis V. Pettit, safety inspector, and Edward Williams, quarry.

Standard Portland Cement Co., Painesville, Ohio, W. A. Davis, vice-president, John E. Goppari, millwright, Erie J. Ochs, superintendent, and F. Quirk, Jr., miller.

Universal Atlas Cement Co., Universal, Penn., E. H. Loveday, employment manager, D. W. McFadyen, chief electrician, J. J. O'Malley, general foreman, C. F. Milne, foreman, and Fred Smith, master mechanic.

West Penn Cement Co., West Winfield, Penn., John Denny, welder, R. P. Hoover, repairman, L. H. Humphrey, repairman, Herman S. Sankey, assistant chief electrician, Harry E. Wright, chemist, Clifford D. Younkins, and J. A. Younkins, safety director.

Miscellaneous—A. J. R. Curtis, assistant to general manager, Portland Cement Association; C. J. P. Cullen, district safety engineer, Commonwealth of Pennsylvania State Workmen's Insurance Fund, Pittsburgh, Penn.; T. P. Kearns, superintendent, Department of Industrial Hygiene, State of Ohio, Columbus, Ohio; K. L. Marshall, mining engineer, U. S. Bureau of Mines, Pittsburgh, Penn.

Attendance at Washington, D. C.

Lehigh Portland Cement Co., Allentown, Penn., Lt.-Col. H. A. Reninger, special representative; Lehigh, Fordwick, Va., M. F. Clement, mill foreman, and W. T. Law, master mechanic; Lehigh, Union Bridge, Md., Guy Baile, carpenter, H. S. Broadwater, master mechanic, John E. Carbin, Howard Gray, chief engineer, Guy E. Green, electric welder, Roy Haines, crusher feeder, R. C. Johnson, carpenter foreman, G. E. Lightner, welder, James T. Marsh, physician, E. D. Meredith, chief clerk, P. M. Rinehart, machine shop foreman, O. S. Rogers, fuller mill maintenance, Charles E. Selby, storekeeper, Marshall Singer, timekeeper, Marshall Sprague, repairman, and M. B. Wilson, timekeeper.

Lone Star Cement Co., Virginia, Norfolk, Va., O. O. Curling, foreman, William Henry Gallup, foreman packhouse, C. H. Georgie, warehouse foreman, P. U. Glennon, chief clerk, W. W. Maples, foreman, G. F. Martinez, superintendent, Wm. Moeller, general superintendent, eastern division, Dwight Morgan, vice-president, H. L. Rawls, finish miller, Ralph R. Riley, district sales manager, Leroy Ross, coal miller, J. J. White, foreman, Charles Whitney, assistant warehouse foreman, and E. N. Woodward, quarry foreman.

Medusa Portland Cement Co., Cleveland, Ohio, W. M. Powell, safety director; Medusa, York, Penn., Clark S. Aldinger, chief clerk, Charles E. Koch, chief chemist, S. C. Kohr, chief electrician, and C. F. McMichael, packhouse foreman.

North American Cement Corp., Albany, N. Y., John J. Porter, vice-president; North American, Security, Md., Otha C. Brandenburg, assistant mill foreman, Walter L. Clark, engineer, Richard Dinkel, repairman, Chester C. Eyler, physical tester, John F. Gruber, manager lime department, Edwin S. Guth, district manager, Paul A. Leichel, assistant superintendent, Earl J. Recher, storeroom, David C. Smith, sheet metal worker, William T. Smith, quarry, Frank C. Storeffer, blacksmith, Russell Zeigler, electrician, and J. H. Zaiser, operating engineer; North American, Martinsburg, W. Va., E. F. Alderton, superintendent, William Bowers, truck driver, H. B. Boyer, mill man, P. S. Cloud, stone plant foreman, A. J. Collier, storekeeper, A. R. Couchman, safety director, Wm. Couchman, kiln foreman, C. M. Nicodemus, office, Leo O'Rourke, laboratory, and Charles Whittington, machinist.

Miscellaneous—L. J. Bowker, district representative, Mine Safety Appliances Co., 23 S. 52nd St., Philadelphia, Penn.; A. J. R. Curtis, assistant to general manager, Portland Cement Association; James J. Davis, Secretary of Labor, Washington, D. C.; Wm. A. Frailey, Johnson-Johnson, New Brunswick, N. J.; Theodore Risley, solicitor, U. S. Department of Labor; R. S. Siegrist, salesman, Hercules Powder Co., Hagerstown, Md.

Good Safety Meeting at Detroit

ONE OF THE MOST ENTHUSIASTIC regional safety meetings of the year was held by representatives of the Michigan and Wisconsin cement mills in Detroit on Tuesday, July 1. There was a noticeable increase in interest shown and a splendid exhibition of improvement in first aid training. The enrollment reached eighty-five and six fully equipped first aid teams were present. L. A. Hutchins, chief chemist of the Wolverine Portland Cement Company, of Coldwater, acted as general chairman.

The program was as follows:

Morning Session—10 a. m.

General Subject—"Safe Practices in the Cement Industry."

Storing, Packing, Shipping—John R. Stearns, superintendent, shipping department Peerless Portland Cement Co., Detroit, Mich.

Cement Mill Shops—H. A. Tillotson, chief engineer, Petoskey Portland Cement Co., Petoskey, Mich.

Raw Grinding—Roy G. Borland, mill

foreman, Huron Portland Cement Co., Alpena, Mich.

Burning and Powdered Coal Handling —F. E. Selfe, chief engineer, Consolidated Cement Corp., Cement City, Mich.

Power Department, P. G. Pellegrom, chief electrician, Alpha Portland Cement Co., Bellevue, Mich.

Luncheon—12:30 p. m.

H. C. Jones, sales manager, Huron and Wyandotte Portland Cement Co.'s, presided.

Address by Col. John L. Boer, secretary, State Department of Labor and Industry, Lansing, Mich.

Afternoon Session—2 p. m.

Address by M. J. Ankeny, senior foreman miner, U. S. Bureau of Mines.

First Aid Contest—Conducted by Mr. Ankeny, assisted by the following members of the Detroit Chapter of the American Red Cross: A. S. Morrow, American Red Cross; Carl Brakeman, Otis Elevator Co.; Major William Greany, Packard Motor Car Co.; Glen Hazen, Frank Horstman and C. B. Moore, Michigan Bell Telephone Co.; R. P. Douglas and Jasper Goodman, Detroit Edison Co., and A. V. Miller, Claude J. Dempsey and J. V. Davies, U. S. Bureau of Mines. Teams participating were: Huron, Alpena plant; Peerless, Detroit plant; Wolverine, Quincy plant; Consolidated, Cement City plant; Alpha, Bellevue plant, and Petoskey.

Dinner—6:30 p. m.

H. F. Jennings, secretary and general manager, Wabash Portland Cement Co., presided. After some safety songs, selections by the "Wolverine Wobblers" were given.

Address by John J. Lovett, general manager, Michigan Manufacturers Association.

L. A. Hutchins, chief chemist, Wolverine, was general chairman of the Detroit meeting

Several of the papers and speeches are being printed as a part of this article not only in recognition of the progress being made by cement mill operating men in the preparation of matter on safety subjects, but also with the belief that many of the ideas expressed should be available for the use of plant safety committees. Other papers will appear in later issues.

The first aid contest proved one of the most interesting held in the industry up to this time. While some of the teams had been in training for periods as long as a year and a half and others were formed within the last few months, none had ever been in contest with teams outside their own plants. Consequently, none were familiar with contest "technique" but all performed the problems just as in case of actual necessity in mill or quarry.

Final scores were:

Team No. 1—Peerless Cement Corp., Detroit, Mich., Score, 95.2.

Team No. 2—Wolverine Portland Cement Co., Quincy, Mich., Score, 94.0.

Team No. 3—Consolidated Cement Corp., Cement City, Mich., Score, 94.2.

Team No. 4—Petoskey Portland Cement Co., Petoskey, Mich., Score, 91.5.

Team No. 5—Huron Portland Cement Co., Alpena, Mich., Score, 89.8.

Team No. 6—Alpha Portland Cement Co., Bellevue, Mich., Score, 96.33.

Registration List

Alpha Portland Cement Co., Bellevue, Mich.—Jesse Ball, physical tester; John Kiso, engineer; Geo. A. Lawniczak, superintendent; Geo. E. Lawniczak, Jr., chemical laboratory; Frank Milton, pack house; Phil G. Pellegrom, chief electrician, and H. J. Vogt, power department.

Consolidated Cement Corp., Cement City, Mich.—Wm. Hicks; Gerald Johns, kilnroom foreman; Marshall M. Mudge, chief electrician; A. J. Pool, chief chemist; Wilbur Rowe, physical tester; F. E. Selfe, chief engineer; Don Snell, assistant superintendent; Albert J. West, and G. F. Wittenberg, superintendent.

Huron Portland Cement Co., Alpena, Mich.—Ralph Lee Bailey, construction; G. R. Borland, foreman; Elmer Evans, construction; Murriel Haltiner, construction; Robert T. Haltiner, construction foreman; H. C. Jones, sales manager; Arthur La Vassar, construction; Grant V. Robertson, construction; W. Marshall Smith, chief chemist, and Martin W. Werner, construction.

Huron Portland Cement Co., Detroit, Mich.—William W. Crapo, and R. H. Townsend, superintendent of plants.

Manitowoc Portland Cement Co., Manitowoc, Wis.—F. E. Town, superintendent.

Medusa Portland Cement Co., Cleveland, Ohio—W. M. Powell, safety director.

Newaygo Portland Cement Co., Newaygo, Mich.—Clifford W. Frede, machinist, and Willard Sherwood, electrician.

Peerless Cement Corp., Detroit, Mich.—Claude M. Buchanan, packer; K. Burke, H. Crosser, Joe Fowler, E. Hooker, H. Jones and W. Wilson, first-aid team; C. R. Ludwick, packer; W. L. Kaiser, superintendent; John R. Stearns, superin-

The Regional Safety meeting in Washington, D. C. The winning first-aid teams shown are from the Berkeley plant, North

tendent shipping, and Robert R. Young, foreman.

Peerless Cement Corp., Port Huron, Mich.—Albert A. Oesterle, superintendent; James R. Wellman, chemist, and E. C. Williamson, foreman, raw mill.

Petoskey Portland Cement Co., Petoskey, Mich.—Chester N. Crick, shop; Leonard Ray Fraley, chemical laboratory; H. E. Hill, raw grinding; Geo. W. John, assistant superintendent; I. McClory, plant superintendent; Geo. E. Murray, crusher; Wallace Switzer, shop; H. A. Tillotson, chief engineer, and M. G. Williams, shop.

Wolverine Portland Cement Co., Coldwater, Mich.—L. A. Hutchins, chief chemist; Raymond Mann, foreman, and Fred A. Swain, department A.

Wolverine Portland Cement Co., Quincy, Mich.—W. L. Brown, clerk, office; Frad Dickenrkects, Curtis Green, Geo. A. Rootes, and Willard Smead, general repairmen.

Wyandotte Portland Cement Co., Wyandotte, Mich.—Harlen Attwater, repair foreman; R. L. Beal, chief chemist; Vern E. Goodwin and Guy Morrison, foremen; Earl A. Sewell, research chemist, and Geo. B. White, employment manager.

Miscellaneous—M. J. Ankeny, senior foreman miner, U. S. Bureau of Mines; Carl Brakeman, Otis Elevator Co.; A. J. R. Curtis, assistant to general manager, Portland Cement Assn.; Joseph F. Davies, assistant mining engineer, U. S. Bureau of Mines; Claude J. Dempsey, foreman miner, U. S. Bureau of Mines; R. P. Douglas and Jasper Goodman, Detroit Edison Co.; Major William Greany, Packard Motor Car Co.; S. E. Hassel, field representative, Mine Safety Appliances Co.; Glen Hazen, Frank Horstman and C. B. Moore, Michigan Bell Telephone Co.; H. G. Jacobsen, Bates Valve Bag Co.; Alex U. Miller, associate mining engineer, U. S. Bureau of Mines; A. S. Morrow, American Red Cross, and O. O. Stone, Michigan manager, Portland Cement Association.

Safety in the Burning Department and in Handling Powdered Coal*

By F. E. Selfe

Chief Engineer, Consolidated Cement Corp., Cement City, Mich.

A LARGE PROPORTION of lost-time accidents at our Peninsular mill have been caused by coal explosions and fire. Good housekeeping applies especially to the coal mill and the handling of pulverized coal.

Coal dust should never be allowed to accumulate on floors, platforms, stairways, and especially on motor platforms. The foremen of each shift should insist that these places be kept scrupulously clean. Care should be taken in keeping elevator housings, conveyor covers, and all other openings in condition to prevent leaks. One would not think of leaving a gas main leak very long without having it repaired; prompt repair of coal leaks is just as important.

When cleaning in and around coal tanks, it is very dangerous to use compressed air. I have in mind a very serious accident which happened, in the middle west, a few years ago. Two men were cleaning out a coal tank, and, they conceived the idea that compressed air would be the thing to use to remove the coal from the tanks. An explosion followed which burned them so severely that they died within a few hours.

It is almost impossible to prevent occasional fires in coal tanks with the equipment installed in most plants. Consequently, coke collects in the bottom of the tanks even if the fires are put out; and at times it is necessary to run the tanks empty and clean them out. The common practice in running the tank empty is, while doing so, to jar the sides of the hopper, making sure it is empty. Sometimes the men are permitted to enter almost immediately to remove the coke or do whatever work is necessary. Such practice has caused a number of fatal accidents and should not be permitted.

The gases which collect in the tanks are very dangerous. Carbon monoxide is odorless, and colorless, and almost impossible to detect. Before anyone is allowed to enter a coal tank, an opening at the bottom of the tank should be provided, so the air can pass up through and carry off the gases.

Extension lights provided with vapor-proof globe protectors should be used. The cord should be well insulated and should be taken to the electrician shop often to be inspected, as an explosion may result from a spark caused by a defective extension.

Care in Starting Kilns

In starting up a kiln, too much care cannot be exercised to make sure that everything is "clear." If the kilns are connected to waste heat boilers, all dampers must be raised and plenty of kerosene, waste, or worn out bags ready for making a good torch. No one except the operator should be allowed near the front of a kiln while starting. Among the more serious accidents that have occurred in the Peninsular mill in the last few years, two have been caused by coal explosion and fire in front of the kilns.

In 1925 the Peninsular company installed two new 11 by 175-ft. kilns, the firing end of these kilns being in line with the firing end of three existing smaller kilns. The smaller kilns were already equipped with a coal conveying system to the kiln coal tanks directly in front of the kilns. In order to avoid disturbing any existing equipment, the new kiln coal feed tanks were placed in the same line.

Owing to the larger size of the new kilns and consequent larger size of the tanks, the space between firing hood and coal tanks was lessened over the old installation. This was not considered at the time especially hazardous, as the old kilns had operated for twenty-eight years

*From a paper read at the Detroit Regional Safety meeting.

American Cement Co., the Union Bridge plant, Lehigh Portland Cement Co., and the North American Hagerstown plant

F. E. Selfe, chief engineer, Consolidated, discussed burning and powdered coal handling at Detroit

without an accident caused by the nearness of the kiln feed tanks. However, in 1928, some repairs were necessary in the coal feed mechanism under one of the coal feed tanks, and the kiln was shut down while this work was being done.

While the kiln was down, it cooled considerably, and contrary to instructions from the plant superintendent, an attempt was made to start the kiln without first applying a torch. The kiln back-fired and the flames shot out enveloping several workmen who were standing near the front. The clothing of these men was impregnated with grease and coal dust, with the result that the men were burned so severely that all of them had to be taken to a hospital. One man died twenty-four hours later.

Two of these men were foremen, one was an electrician oiler and one a kiln operator. All of them had been with the company from eight to twenty years. This was a serious accident, but was the result of violation of instructions and it was not deemed necessary at the time to make any changes in the equipment. However, about a year later, repairs were again necessary on one of the coal feed screws.

In making the repairs, the coal dust was cleaned from in and around the tanks creating considerable dust which was ignited by the other kiln. Again a workman was burned and although not so seriously this time, the occurrence was serious enough to give us a severe shaking up as to our responsibility in guarding against future accidents.

Accordingly, our company at once took steps to move the tanks further away from the kilns and to install a new elevating and conveying line to feed the tanks. This has been completed and the tanks are now 30 ft. from the firing hood to the center of the tanks, with a wall in front of the tanks and between it and the firing hood, giving 22 ft. of clear space directly in front of the kilns.

This work was accomplished at a cost to the company of some $17,000 and it is believed the present installation will eliminate all chance of further accidents of a similar nature, due to back firing or a fire hazard when making repairs around the coal feed. This is in line with our company's attitude in taking all possible precautions to eliminate the possibility of accidents and recurring accidents of similar nature.

Hazards in Storing, Packing and Shipping Departments*

By John R. Stearns

Superintendent, Shipping Department, Peerless Portland Cement Co., Detroit, Mich.

I HAVE COME UP through the days when little or no interest was expended on safety to the employes. In the last few years, however, an almost complete change has occurred and everything is the reverse of former days. Every place where there is a chance for anyone to get hurt is guarded and what I think is of the most importance, we are working with all the interest, zeal, and combined ideas of the entire manufacturing world to educate the men to think, act and work safely. It is the educational part that is bringing us farthest toward the desired end, absolute safety.

The old-fashioned oblong storage with its dragline and open screw below the floor line, with the attendant slides where the cement would cover the men, along with the machinery, has been replaced by the round silo equipped with spouts so that you can draw the silo almost empty.

When we have to send men into a silo, we blow the side down with compressed air through a slide in the manhole plate which is about five feet above the floor level and then we examine the sides with a light from the top manhole to be sure that it is safe before sending in the men. Never send a lone man into a silo. Have him take a helper, as four eyes are better than two and cement is a very treacherous material. If anything goes wrong, the helper can secure assistance.

We use the spout system with screws, pumps and elevators for delivery to and from silos. The conveyors are of the closed box type, setting above the floor level and all covers are bolted down to keep the cement from raising them off when a slide occurs. This also keeps the dust confined, making a cleaner, safer and better place in which to work.

We have a glass covered peep hole, about 4 in. by 6 in. in the cover of the screw conveyor under each silo so that the draw man, by placing light over this glass, can see what load he is carrying. When we have to work on a conveyor, the switch must be pulled and compensator placarded to avoid any possible chance of motor and screw being started. I insist that a man does not have to get into a conveyor box in order to work on it.

We use the Bates packer and our worst enemy to safety there is the bursting of bags while filling, hitting the pullers directly in the face and eyes. Last year we decided to furnish goggles and compel pullers to use them and as a result we have practically eliminated our eye accidents. A guard for use as protection to the pullers is now available and strong claims are made for its effectiveness.

Our loading equipment and pack houses are designed for truck loading, and the

John R. Stearns, superintendent, shipping department, Peerless, Detroit, one of the speakers at the Detroit regional safety meeting

*From a paper read at the Detroit Regional Safety meeting.

machines are set to deliver onto a belt or chute that is lowered onto the truck and controlled by the loader through an electric hoist. We have installed a counterweight to lessen the strain on the hoist and in case the cable breaks, the chute will not drop clear down. We also have this device equipped with safety chains.

Whenever a bag breaks there is a man ready to clean off the truck to prevent cement from flying into the loader's eyes when he drops the next sack. We have all varieties of trucks and have to keep a close eye on the driver so that as the load is placed, he always goes ahead. Sometimes, one gets excited and backs up with the possibility of catching the loader between load and belt.

When we started loading what we call trains, a truck and two trailers, we had quite a time making boys see why the pulley must be stopped and belt cleared before shifted from truck to trailer. They see the reason now and that hazard has been eliminated.

We have our general safety committee which meets once a month and consists of superintendents and foremen. The working men's committee meets once a week and is made up of a man from every department, each to serve one month. Both committees are doing wonderful work.

In our plant there also is a kangaroo court, held every Tuesday noon from 12:15 to 12:45. It is presided over by a judge elected by the men and a jury selected by the judge. The court tries men who are practicing unsafe methods, allowing full opportunity to argue the matter out. If a man is found guilty a light sentence is pronounced, such as the wearing of a white oil cloth coat with "Safety First" printed on one side and a statement of the offense on the other. The convicted man must make one trip through the mill displaying the coat. I honestly think this court has done more to promote safety than any other measure we have taken.

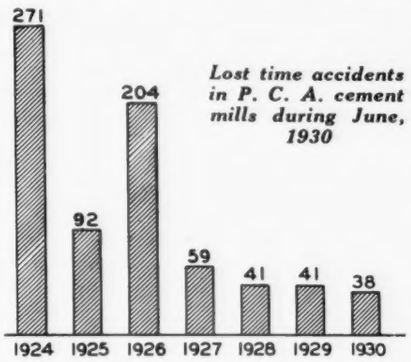
June No-Accident Campaign Again Cuts Mishaps

APPARENTLY COMPLETE REPORTS from member plants of the Portland Cement Association, which participated in the June, 1930, no-accident campaign indicate a total of 38 lost time accidents. There were no fatal accidents during the month.

This record beats, by a margin of three fatals, the results obtained in the 1929 no-accident campaign. (Final reports for June, 1929, showed 38 lost time and 3 fatal accidents.) While the thousands of cement men who put their best efforts in this campaign will regret that the showing was not even better, all will rejoice that the month was completed without loss of life to a single man. With respect to fatals certainly the reduction was significant and obviously worth all of the energy put into the campaign.

The 38 accidents reported occurred in 23 plants. Of this number, eighteen plants suffered just one lost time accident; six plants suffered two lost time accidents and one plant suffered eight lost time accidents. These accidents were distributed among the various departments as follows: quarry 12, raw mill 4, burning 3, finishing 3, crushing 2, packing and shipping 1, power 1 and yard 1. Eleven additional accidents occurred which it is not yet possible to distribute by department.

Absence of fatal accidents during June recalls the gratifying recession in fatal



accident rate during the first six months of 1930. During the period from January 1 to June 30 only 7 fatals were reported, as against 17 fatals reported during the corresponding period of 1929.

June accidents for which reports have been received by the Portland Cement Association were as follows:

Quarry

Brakeman on quarry train slipped from draw bar on which he was standing, crushing foot.

Laborer was struck in mouth by fragment of flying rock from a blast. Mouth severely cut and tooth broken out.

Air line to rock drill broke, whipping driller on legs, bruising and otherwise injuring latter.

Stone fell from car, striking laborer on head. Injured was stunned and head bruised. Time lost, 8 days.

Box car at quarry jumped track. Brakeman who was riding car was thrown off, landing on head. Head, shoulders and back were injured, bad cut being inflicted on right side of head.

Laborer sprained right hand while lifting ties.

Brakeman on dump car missed step and went down, wheel passing over foot. The latter was badly crushed, 5 bones being broken or mashed.

Laborer working as extra switchman tripped and fell as he reached string of cars, wheel probably passing over part of hand. Injury included compound comminuted fracture of thumb, lacerated palm and injuries of unknown extent to two fingers.

Powderman at work springing holes was reloading for another when spring powder exploded. Forearm was severely lacerated; finch wound near right eye; left hand severely bruised; cuts and abrasions all over the body.

Driller was barring down rock when a piece rolled and struck him on leg, causing a large and possibly dangerous puncture wound.

Dragline fireman was pulling chock from under loaded gondola car. Chock caught his glove and pulled arm under moving car, severing arm just below elbow.

Brakeman was caught between locomotive and car, suffering severe crushing of left thigh, with laceration of muscles.

Crushing

Rock from pile fell on laborer's foot, causing a bad bruise.

Crusher foreman hurt his back in lifting end gate of gondola car to put it back in place. Five days lost.

Raw

Employe was helping to replace a door on a rock dryer when his foot slipped into some hot dust. The foot was burned and has become infected.

Laborer fell 8 ft. to the ground from top of slurry tank base, breaking two bones of foot.

While laborer was endeavoring to take off ring section from Bradley mill, section fell, crushing two toes of right foot.

Laborer was cleaning up around rock conveyor belt when his shovel caught in belt, throwing it around, striking him on knee, badly bruising bone and muscles.

Burning

Repairman was on ladder putting belt on clinker elevator when ladder slipped, causing victim to fall on an old pier. Hips were bruised, arm and hand injured.

While employe was working inside of cooler some hot dust fell on back of ear, causing slight burn.

Employe was poking out clinker housing under kiln and was burned about face, hands, feet and back.

Finishing

Laborer was operating jackhammer drill when drill steel snapped off and machine fell. In trying to check fall, finger was jammed between top of broken drill and hammer. There was a slight fracture of terminal phalange of little finger.

Oiler was removing a panel from Huntington mill. Panel slipped off hook and fell to floor, striking injured on instep, fracturing two bones.

While taking burning hose out through window at clinker mill, cement fell from overhead and got into employe's eyes. A loss of 3 days' time resulted.

Packing and Shipping

Packer strained his back while engaged in throwing out a broken sack while stacking sacks in car.

Shops

Carpenter was helping to turn a piece of 4½-in. by 12-in. by 10-ft. oak timber on saw carriage. Timber rolled off carriage, striking right foot, badly bruising instep.

Yard

Laborer was standing by roadside at railroad crossing as tractor hauled stoneboat across. The latter caught on track, swung toward injured, striking him on leg, causing a compound fracture.

Iowa Crushed-Stone Company to Expand

THE DOUDS STONE CO., Douds, Iowa, has recently entered into a five-year contract with the Rock Island Railway Co. to furnish a minimum of 52,000 tons of stone per year.

This contract will necessitate doubling the capacity of the quarry and the installation of a lot of new equipment, a considerable part of which is already on the grounds. The output has recently been averaging around five or six cars daily. The output under the new contract must be at least 10 cars daily.

The Rock Island contract itself means 1000 tons of rip-rap or ballast weekly or about 166 tons daily. Aside from that there is also a large demand for crushed stone for road paving.

The Douds Stone Co. plant is located adjacent to the Rock Island track, about one mile east of Douds. The secretary and manager, H. E. Millen, makes his home in Douds.

The excellent limestone is quarried or mined from a mine which has already assumed large proportions, large enough in fact to accommodate the Van Buren county court house and abundant room to spare.—*Bloomfield* (Ia.) *Democrat.*

United States Gypsum Co. Buys Steel Plant

THE United States Gypsum Co., Chicago, Ill., has announced the purchase of the No. 2 plant of the American Welding Co. at Warren, Ohio. The company will move to this plant its metal lath division, recently purchased from the Youngstown Pressed Steel Co. It will also transfer equipment from its recently purchased property, the Northeastern Sand and Metal Co., Jeanette, Penn. The new Warren plant is expected to provide employment for 500 men.—*Cleveland* (Ohio) *Plain Dealer.*

Combined Cement Products and Ready-Mixed Concrete Plant

HURON, Ohio, is now the possessor of perhaps one of the finest and most modernly equipped cement block and cement mixing plants in the United States, the Huron Cement Products Co.'s new plant having been completed. J. H. McCormick holds almost all of the stock and is general manager of the company. The new plant presents a model in capacity and efficiency in a compact space that is believed by critics who have inspected it not to be equaled anywhere. It has a daily capacity of 600 cement blocks or 25 cu. yd. of mixed concrete. With a floor space of approximately 2500 sq. ft. this capacity is considered unusual.

The material for the production of either mixed wet concrete or cement blocks is dumped in a hopper where elevator buckets convey it into three separate bins of ample capacity, each bin containing a different grade of sand, gravel and crushed stone. From these bins the material is drawn into the mixer where cement is added and the wet mixed concrete either chuted into the mixer trucks for delivery or conveyed to the concrete-block tamping machines. The green blocks are taken from the machines and placed on an ingenious overhead track conveyor and pushed into the curing room which is 16 by 60 ft. Here the blocks are properly cured by the application of the proper amount of moisture for a period of time.

When thoroughly hardened they are placed on push cars and distributed to a storage yard which has a capacity of about 20,000 blocks which is the maximum amount of stock carried on hand.

The building is of cement block and frame construction, with steel window sash and is practically fireproof.

Mr. McCormick gives especial credit to Leland Knight, who assisted Mr. McCormick in devising the conveyors and elevators. The electrical work was installed by W. E. Garlick and the mechanical hookup is incased in a steel cabinet. It is so devised that the machinery may be stopped or started from a series of push buttons located in various convenient places about the building and even outside of the building. This contributes in a marked degree to the safety of the employes and the machinery in case of any obstruction falling into the machinery.—*Huron* (Ohio) *Reporter.*

Sand-Lime Brick Production and Shipments in June

THE following data are compiled from reports received direct from 18 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is three less than those furnishing statistics for the May estimate, published in the July 5 issue. The statistics below may be regarded as representative of the entire industry in the United States and Canada.

Although the number of plants reporting is three less than for the previous month, it is estimated that production remains about the same as in May, with only one plant reporting that it was not at present producing. Likewise, do shipments by rail and truck, stocks on hand and unfilled orders average about the same.

The following are average prices quoted for sand-lime brick in June:

Shipping point	Plant price	Delivered
Atlantic City, N. J.	$12.00	$17.00
Boston, Mass.	11.00	14.50
Dayton, Ohio	12.50	15.00
Detroit, Mich.	.....	15.50@16.00
Detroit, Mich.	12.00	15.50
Detroit, Mich.	.....	16.00
Grand Rapids, Mich.	14.50	.....
Iona, N. J.	12.00	16.00
Jackson, Mich.	13.00	.....
Milwaukee, Wis.	10.50	13.00
Mishawaka, Ind.	11.00	.....
Saginaw, Mich.	12.00	.....
Syracuse, N. Y.	18.00	20.00
Toronto, Can.	11.00	13.00
Winchester, Mass.	.....	15.00

The following statistics are compiled from data received direct from 18 producers of sand-lime brick in the United States and Canada:

Statistics for May and June

	†May	*June
Production	12,708,293	10,316,785
Shipments (rail)	3,272,153	2,929,465
Shipments (truck)	7,558,562	6,776,232
Stocks	12,975,203	12,825,419
Unfilled orders	10,706,000	9,314,000

†Twenty-one plants reporting; incomplete, two not reporting stocks on hand, and seven not reporting unfilled orders.

*Eighteen plants reporting; incomplete, one plant not reporting stocks on hand, and four not reporting unfilled orders.

Notes from Producers

The Saginaw Brick Co., Saginaw, Mich., is circulating an interesting piece of advertising matter illustrating and describing a recent outstanding construction job, for which 400,000 of its sand-lime brick were used.

Sand-Lime Products Co., Detroit, Mich., continues to keep its "Rock-O-Lite" sand-lime brick in the limelight with attractive little mailing pieces describing its product, telling where and how to use it, and other informative data.

New Canadian Gypsum Operation

THE CANADIAN GYPSUM CO., LTD., incorporated in 1907 with a Dominion charter to operate in the manufacture and sale of gypsum products, has broken ground at Hillsboro, N. B., for the first mill in a chain of modern gypsum plants to serve Canadian builders from coast to coast. The plant will be located on tidewater, where the company's four ocean-going vessels can load the finished products for export. Large quantities will be shipped to a Montreal warehouse for redistribution, where this grade of pure white gypsum is expected to displace the material now imported from Belgium.

This Maritime plant at Hillsboro will be operated in connection with the Canadian Gypsum Co.'s large gypsum properties and docks at Windsor and Digby, where a million tons is put into the company's boats annually, for mills in New York, Boston and Philadelphia.

F. S. Gibbs, manager of Canadian sales, reports a growing demand for gypsum and lime products. While the volume of building activity is spotted with a few markets showing a loss this year, he is confident of a steady growth in Canadian population and industry through the next ten years and, with this in mind, his company is prepared to invest several million dollars in the construction of Canadian gypsum and lime plants to manufacture a full line of their patented products used in all types of building. The present sales organization will be increased, locating the management and general sales office of the company at Toronto, Ont.

Feldspar Company Takes Over Operation of Municipal Quarry

THE CONTRACT between the city of Bath, Me., and the J. W. Cummings Feldspar Co., for the leasing of the city's stone crushing plant on the so called "Brick Yard" lot on Court street for five years was executed recently when it was signed by John W. Cummings, president and treasurer of the J. W. Cummings Feldspar Co., and by City Treasurer Ralph K. Hall in behalf of the city. Under the terms of the contract the city will be obliged to purchase all its crushed rock from the company which will sell at an established rate of $2.40 per ton. The Cummings company however has the right to sell any quantity to outside purchasers when not filling the city's requirements, but must pay the city 10c per ton for such quantity disposed of. The city is to be protected from any liability by an indemnity bond furnished by the lessee. Although the crusher has not been used for some years it is to be restored by the lessee at no expense to the city.—*Bath* (Me.) *Times.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Trend in Designs on Cement Products

By George Rice
Palo Alto, Calif.

Part II—Fixed Principles of Design Cannot Be Overlooked to Favor "Art Moderne"

WHILE THE FUTURISTIC designs on the normal line of cement objects are somewhat more subdued at present than they

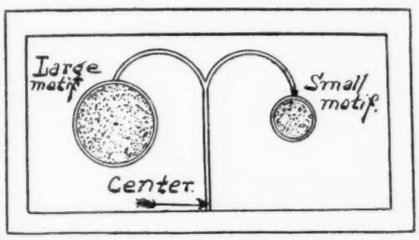


Fig. 1. A design is not well balanced when the motifs on both sides of the center are of unequal weight

were last season, the cubist patterns continue to be gay in their architectural layout of forms. The designs in the latter patterns ap-

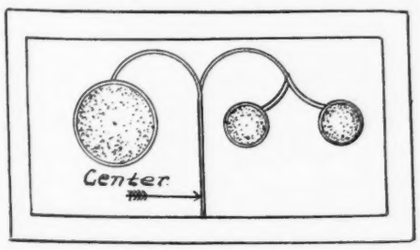


Fig. 2. A balance can be obtained by using two small motifs to balance the large motif

pear to be getting more daring each year. In this age of modernistic creations in almost every article that carries figurements and colors, it is not surprising to see designs on tile and pottery which have been made up on the basis of ancient, mediaeval and modern material.

There are artisans engaged in formulating designs on objects made from rock products who achieve more or less success by the simple process of changing established linear conventions. We have spoken with some of these persons and have noted their work, some of which is worthy, while some evidently is lacking the merit and magnetism needed to interest the average customer, for some of it which we saw presented a dusty appearance as it laid in a remote corner of a studio or a store.

We can class these artisans as distortionists, costumists and mechanists. The distortionists seek originality by shifting the motifs in a design about to such extent that their former creators will hardly recognize them. Equilibrium or balance of the parts composing the pattern are disregarded. Geometric arcs and angles are switched about with regard to harmony of forms.

A design of a curious construction is obtained, at least, and there are plenty of people who will seek out the curios rather than the standard types of designs.

The so-called costumists strive for the aesthetic in the designs. The styles achieved by this class of designers tends towards draping. That is, whatever the type of design they make, they feel that it is necessary to decorate it with flowing effects. Their ability to incise applied ornamentation in cement to represent something creeping up or crawling across a relief pattern is wonderful. They model their designs after the manner of luxuriously hung window curtains. Some

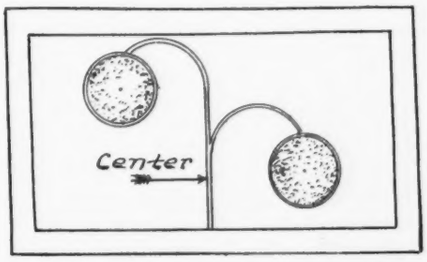


Fig. 3. An alternate balance is obtained when motifs of equal weight are used, even if one is placed higher or lower than the other

are beautiful to see and a friend of ours who is designing this sort of material is successful in marketing his products.

The designer in cement of the mechanist order is of course the artisan who is aware of the fact that this is a mechanical age and consequently he devotes much of his time and energy to devising plaques ornamented with airships, automobiles and things appertaining to this scientific age. We know of one man who devised a plaque with the figure of

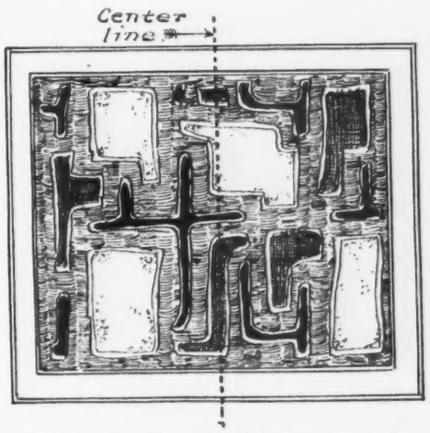


Fig. 4. A symmetrical balance can be made with motifs of different weights if the units are properly distributed

a racing motorist on it. An oil company placed an order with him for several thousand of these plaques to hang in their service stations throughout the country.

Proper Balance Necessary

The cement design may be based on the ideas of the distortionist, the costumist, the mechanist, or on these of the every day designer of this class of products. If that little item of balance is ignored, the design may pass inspection in a general way, but it will present an unfinished aspect and many who see it will know that something is wrong,

although they may not be able to tell what.

We submit a few drawings to demonstrate some points our experience has taught us. Assuming that there is a center in the average type of design, and larger or more motifs are placed on the left side of that center line, as shown in Fig. 1, than on the right side, we are not going to have a properly balanced design from the start.

The poor balance can be corrected by adding weight in the form of more or a larger motif on the weak side of the line, but it is better to start off right, than to patch up the design when the error is detected. For instance, a correct balance in weight of motifs on each side of the center line is obtained at the start by using two small motifs on the right to balance the one large motif on the left as in Fig. 2.

Or, what is called the alternate balance can be employed, as shown in Fig. 3, for here we have motifs of equal weight on each side of the center, and a well balanced design, although one motif is lower than the other.

Design in Which Spots Are Equalized in Weight Throughout Pattern Is Satisfactory to Eye

The spots or motifs in a design do not have to be equal in area to make a balance which will be satisfactory to the eye, for the proper symmetrical arrangement can be had with an effect which is as scattering in its spots as shown in Fig. 4. There is enough harmony here to satisfy the eye, although the different units vary in shape. It is a balance by symmetrically laying out the respective units in the pattern scheme.

Of course, these principles have been in use for centuries by the artists of Italy and for a long time by the cement designers of this country. But judging from some of the designs we have seen recently, more attention is given to novelty and fantasy than to an observance of the fixed rules of design. However, as one artisan said, "We have got to create what the public wants." Apparently the public is favorable to novelty and fantasy at present.

National Ready-Mixed Concrete Association Completes Organization Plans

REPRESENTATIVES of producers of ready-mixed concrete and others interested in ready-mixed concrete met on July 10 at the William Penn Hotel, Pittsburgh, Penn., and completed the organization of the National Ready-Mixed Concrete Association. J. E. Burke of Pittsburgh, Penn., was elected the first president of this new national organization; C. M. Cornell, Boston, Mass., and H. F. Thomson, St. Louis, Mo., were chosen as eastern and western vice-presidents, respectively. R. B. Young, Toronto, Ont., was elected Canadian vice-president; John C. Eakin, Little Rock, Ark., was chosen as secretary and J. L. Shiely, St. Paul, Minn., treasurer. The election of this group of officials gave representation to the industry over as wide an area as would be consistent with effective activity and usefulness to the industry, it was believed. In this new organization, owing to the great distances and the question of time element, it was felt that an officer from as far west as the Pacific Coast would not be able to discharge his duties or to take part in all of the activities of the new association without making too great a sacrifice.

At the Chicago organization meeting held May 16 of this year it was deemed advisable to proceed with the organization of the industry, and accordingly a committee was appointed at that time to formulate a report for approval at a later meeting, which would set forth the determination of the producers of ready-mixed concrete to organize on a national basis. This report as approved recommended the appointment of an organization committee charged with the duties of canvassing the industry and arranging for the final organization meeting. This committee held a meeting at Pittsburgh on May 28 and decided to hold a meeting definitely launching the association on July 10. This committee also made a report covering the scope of the national ready-mixed concrete association, which was read at the meeting and which with some modifications was adopted.

J. E. Burke

At the meeting a committee consisting of R. B. Young, J. L. Shiely and Alexander Foster, Jr., was chosen to prepare a constitution and set of by-laws. One of these three will later be appointed chairman by the president.

Article 6 of the report was so amended as to direct the executive committee to request the co-operation of all national trade associations whose work included to any degree the production or use of ready-mixed concrete. This in essence eliminated the advisory committee and automatically eliminated Article 8 that followed later.

Other than these changes the report of the organization committee was adopted as originally outlined. The complete report is as follows:

Outline of Organization

1. That the name of our organization should be The National Ready-Mixed Concrete Association.

2. That its purpose shall be to promote the welfare and best interests of those engaged in the manufacture and sale of ready-mixed concrete.

3. That the membership shall be divided into two groups: Members and Associate Members, as classified at the Chicago meeting.

4. That the officers of the association shall consist of a president, three regional vice-presidents, a secretary, and a treasurer.

5. That the officers of the association shall constitute, with the addition of one member at large, the executive committee of this association. The member at large shall be chosen by the executive committee.

6. That an advisory and technical committee of the association shall be appointed, of which the president of the National Ready-Mixed Concrete Association shall be chairman, the other members of the committee to consist of the members of the executive committee and of one representative from each of the following organizations: Associated General Contractors, American Road Builders' Association, National Builders' Supply Association, National Crushed Stone Association, National Lime Association, National Sand and Gravel Association, and National Slag Association, the Portland Cement Association, and of such additional associations as shall be designated from time to time by the executive committee. (This article was modified as previously indicated.)

7. That the direction of the activities of this association shall be vested in the executive committee.

8. (Eliminated as noted.)

9. That the headquarters of the association shall be located in the same city as the president until such time as the association shall employ a full-time executive officer. When such officer is employed, the permanent headquarters of the association shall be selected by the executive committee.

10. That a committee shall be appointed at this meeting, consisting of a chairman and two members, to draw up a constitution and by-laws for the association.

11. That the staff of the association at this time shall consist of an assistant secretary, who shall work under the direction of the president.

12. That the executive committee shall be authorized to make such disbursements as are necessary and to incur such obligations to fulfill the recommendations of this report.

13. That the dues of the association for the first year shall be as follows:

MEMBERS

Located in cities of 0 to 50,000 population—$50 per year.
Located in cities of 50,000 to 100,000 population—$100 per year.
Located in cities of 100,000 to 250,000 population—$150 per year.
Located in cities of 250,000 to 500,000 population—$250 per year.
Located in cities of over 500,000 population—$300 per year.

ASSOCIATE MEMBERS

Flat basis of $100 yearly.

No definite arrangements were made for the next meeting, but expressions indicated that the next session should be at the same place and time of the meeting of the National Sand and Gravel Association.

The acceptance of the report of the organization committee took up the entire morning session and during the afternoon a short, more or less informal meeting of the producers was held; and problems relative to the industry were discussed.

Following is a complete list of those present:

Registration

Ahern, V. P., National Sand and Gravel Association, Washington, D. C.
Brooks, R. E., National Equipment Corp., Milwaukee, Wis.
Brookman, Louis, Jr., *Concrete* Publishing Co., Chicago, Ill.
Bunn, George N., Clinton Motors Corp., Reading, Penn.
Boyd, J. R., National Crushed Stone Association, Washington, D. C.
Bainbridge, H. B., Johns-Manville Sales Corp., New York City.
Butler, H. W., Whitmore Rauber and Vicinus, Rochester, N. Y.
Burke, J. E., the Ready Mixed Concrete Co., Pittsburgh, Penn.
Connor, C. W., American Road Builders Association, Washington, D. C.
Connar, V. N., Universal Atlas Cement Co., Pittsburgh, Penn.
Coffman, Herbert, Hercules Cement Corp., Philadelphia, Penn.
Daniel, R. B., Ketchum MacLeod and Grove, Pittsburgh, Penn.
Dann, Alex W., the Ready Mixed Concrete Co., Pittsburgh, Penn.
Drain, R., Rosslyn Steel and Cement Co., Washington, D. C.
Donohue, E. P., Jeffrey Manufacturing Co., Columbus, Ohio.
Donulson, J. E., Sloss-Sheffield Iron and Steel Co., Birmingham, Ala.
Ellsworth, C. E., National Lime Association, Washington, D. C.
Ellis, George C., Ransome Concrete Machine Co., Dunellen, N. J.
Eisenberg, C. D., the York Concrete Co., York, Penn.
Ferguson, S. A., Jaeger Machine Co., Columbus, Ohio.
Frack, P. D., the Good Roads Machinery Co., Kenneth Square, Penn.
Foreman, H. E., Associated General Contractors of America, Washington, D. C.
Foster, Alexander, Jr., Warner Co., Philadelphia, Penn.
Gilmone, H. H., West Penn Cement Co., Butler, Pittsburgh, Penn.
Garber, M. B., the Thew Shovel Co., Lorain, Ohio.
Ginsberg, Frank I., H. O. Penn Co., New York City.
Goldbeck, A. T., National Crushed Stone Association, Washington, D. C.
Gillespie, J. P., Parke Concrete Carrier, Inc., New York City.
Graham, O. J., Super Concrete Corp., Washington, D. C.
Graham, W. G., Super Concrete Corp., Washington, D. C.
Hill, Edwin F., Jr., Transit Mixers, San Francisco, Calif.
Jones, J. A., West Penn Cement Co., Butler, Penn.
Kennedy, W. H., Johns-Manville Corp., Pittsburgh, Penn.
Kolinski, Jim, Kolinski Ready Mixed Concrete, Milwaukee, Wis.
Lenhart, W. B., ROCK PRODUCTS, Chicago.
Levison, Arthur A., Blaw-Knox Co., Pittsburgh, Penn.
MacGregor, Roy A., Highway Truck Mixers, Pittsburgh, Penn.
McLean, R., Transit Mixers, Inc., San Francisco, Calif.
McBride, R. R., Heltzel Steel Form and Iron Co., Warren, Ohio.
Miller, A. E., Chain-Belt Co., Milwaukee, Wis.
Mumma, Walter M., Pennsylvania Supply Co., Harrisburg, Penn.
Melzer, K. H., C. S. Johnson Co., Champaign, Ill.
Morton, A. R., Butler Bin Co., Waukesha, Wis.
Ornitz, Ed M., Blaw-Knox Co., Pittsburgh, Penn.
Prushing, Roy D., Jeffrey Manufacturing Co., Columbus, Ohio.
Rosser, Robert C., Ready Mixed Concrete Co., Wilkes-Barre, Penn.
Stauffer, P. F., Fuller Co., Catasauqua, Penn.
Sullivan, Ralph C., ROCK PRODUCTS, Chicago.
Seward, P. F., American Road Builders Association, Washington, D. C.
Shiely, Albert R., J. L. Shiely Co., St. Paul, Minn.
Thomson, H. F., General Material Co., St. Louis, Mo.
Walker, Stanton, National Sand and Gravel Association, Washington, D. C.
Wilson, James J., Silica Products Co., Kansas City, Mo., and Aquagel Sales Corp., Philadelphia, Penn.
Watt, A. G., Lehigh Portland Cement Co., Allentown, Penn.
Whitman, Byron W., Ready Mixed Concrete Co., Reading, Penn.
Young, R. B., Toronto Ready Mix Concrete Co., Ltd., Toronto, Ont., and Montreal, Que.

Census Bureau Gives Data on Cement Products

THE ENTIRE concrete-products industry of the United States is located in a small group of counties, the location of which should be of interest to all those who sell to this industry, the chief of the industrial goods section of the census of distribution, Edward R. Dewey, stated orally July 11. There are 2,344 establishments in the United States classified as manufacturers of concrete products who do an annual business in excess of $5,000 and almost half of these are located in 53 of the 3,075 counties, he said.

This information, along with all other factual data concerning this industry is being gathered in the current census, Mr. Dewey pointed out, and should be of aid to those selling to this industry for the reason that it shows that there are almost 2,500 counties in the United States that have no such industry, and consequently there is no use looking there for business, by advertisement or otherwise. It should be of interest to those already in the business, who wish to establish branches in the best locations, and also to those who contemplate entering the business and wish a field that is not overcrowded, he said.

The industry is concentrated in a few counties to a large degree, it was shown, but the remainder of the industry is stretched throughout the nation, only three states not having such an industry. The entire industry of 2,344 establishments is located in 606 counties, the largest of which is Cook county, Illinois, which had, at the time the survey was made, 61 such establishments.

The census classification, "concrete products," covers building blocks, building trimmings, cement roofing tile, and other articles such as burial vaults, manufactured from a combination of stone or gravel and sand, with cement, Mr. Dewey explained.

No information in regard to the size of the concrete-products industry, by counties or industrial areas, has ever been published by the Bureau of the Census, it was said, but much data on this industry as a whole can be obtained by writing to the Bureau. At the same time a list of the counties containing this entire industry can be procured, while the following is a list of those counties containing 10 or more establishments:

California:	
Alameda	10
Los Angeles	43
San Bernardino	10
San Diego	11
Connecticut:	
Fairfield	10
Florida:	
Duval	11
Illinois:	
Cook	61
Winnebago	11
Indiana:	
Lake	19
Marion	19
Maryland:	
Baltimore	10
Baltimore City	18
Massachusetts:	
Essex	10
Middlesex	23
Suffolk	12
Michigan:	
Genesee	12
Kent	11
Oakland	23
Wayne	54
Minnesota:	
Hennepin	22
St. Louis	11
New Jersey:	
Bergen	19
Camden	16
Essex	34
Hudson	13
Middlesex	11
Union	23
New York:	
Bronx	12
Erie	25
Kings	33
Monroe	11
Nassau	18
Onondaga	10
Queens	29
Suffolk	13
Westchester	15
Ohio:	
Cuyahoga	25
Franklin	17
Hamilton	15
Lucas	16
Summit	11
Pennsylvania:	
Allegheny	44
Beaver	10
Delaware	15
Lancaster	10
Montgomery	13
Philadelphia	13
York	12
Rhode Island:	
Providence	12
Texas:	
Bexar	10
Dallas	11
Harris	10
Washington:	
King	15
Wisconsin:	
Milwaukee	44
Total, 53 counties	1,001

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, N. J.	.....	.65	1.25	1.25	1.15	1.15
Attica and Franklinville, N. Y. (a)	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.25	1.15	1.75	.....	1.75	1.75
Buffalo, N. Y.	1.00	1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.70	.90	1.25	1.25	.....	.....
Machias Junction, N. Y.	.65	.65	.65	.....	.65	.65
Montoursville, Penn.	1.00	.75	.75	.60	.50	.50
Northern New Jersey	.30– .50	.30– .50	.90–1.25	.....	.90–1.25	.....
South Portland, Me.	.....	1.00	2.25	2.00	2.00	2.00
Georgetown, D. C.	.55	.55	1.00	1.00	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.60	.30	.30	.40	.40	.40
Attica, Ind.	.....	.....	All sizes .75–.85			
Barton, Wis.	.....	.40	.50	.60	.60	.60
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Crystal Lake, Ill.	.30	.15	.25	.30	.30	.40
Des Moines, Iowa	.30– .60	.30– .60	1.50–1.65	1.50–1.65	1.50–1.65	1.50–1.65
Dresden, Ohio	.....	.....	.....	.80	.70	.....
Eau Claire, Wis.	.....	.40	.55	.85	.85	.....
Elkhart Lake and Glenbeulah, Wis.	.50	.30	.50	.60	.50	.50
Grand Rapids, Mich.	.....	.50	.....	.80	.80	.70
Hamilton, Ohio	.65– .75	.65– .75	.65– .75	.65– .75	.65– .75	.65– .75
Hersey, Mich.	.....	.50	.....	.50	.70	.70
Humboldt, Iowa	.40– .50	.40– .50	1.10–1.30	1.10–1.30	1.10–1.30	1.10–1.30
Indianapolis, Ind.	.50.– .60	.25– .60	.40– .60	.45– .75	.45– .75	.45– .75
Kalamazoo, Mich.	.....	.50	.50	.60	.65	.75
Kansas City, Mo.	.70	.70	.....	.80	.....	.....
Mankato, Minn.	.55	.45	1.25	1.25	1.25	.....
Mason City, Iowa	.....	.50	.....	1.25	1.25	1.25
Milwaukee, Wis.	.....	.86	.86	.96	.96	.96
Minneapolis, Minn.	.35	.35	1.25	1.35	1.35	1.25
Oxford, Mich.	.25– .35	.20– .30	.30– .40	.55– .75	.55– .75	.60– .75
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Urbana, Ohio	.65	.55	.65	.65	.65	.65
Waukesha, Wis.	.....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.50	.....	.....	.....	.....	.....
Charleston, W. Va.	.70	1.25	1.25	.....	.....	.....
Eustis, Fla.	.....	.40– .50	.....	.....	.....	.....
Fort Worth, Texas	.75	.75	1.00	1.00	1.00	1.00
Knoxville, Tenn.	.80	1.00	1.50	1.20	1.20	1.20
Roseland, La.	.20	.20	.70	.70	.60	.....
WESTERN:						
Oregon City, Ore.	Sand for concrete, 1.00-1.50 per cu. yd. at plant					
Phoenix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60	.....	1.20	1.20	1.15
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.25*

*Cu. yd. ‡Delivered on job by truck. (a) Prices on trucks; on cars, 65c per ton for all sizes.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.00	.....	.....	4.00	.....
Cedarville, N. J.	Washed, 1.75 net ton; dried and washed, 2.25 net ton						
Cheshire, Mass.	Sand for soap, 7.00–8.00					6.00–8.00	.....
Columbus, Ohio	1.50	1.50	1.35	.90	.....	3.50–4.50	.....
Dresden, Ohio	1.25–1.50	1.25–1.45	1.25–1.75	.85–1.25	.....	.....	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.00–3.00	.....
Elco, Ill.	Soft amorphous silica, 92%–99% thru 325 mesh, 18.00–40.00 per ton						
Montoursville, Penn.	.....	.....	.....	1.35–1.50	.....	.....	.....
New Lexington, Ohio	2.00	1.25	.....	.....	.....	.....	.....
Ohlton, Ohio	1.75*	1.75*	.....	2.00*	1.75*	1.75*	.....
Ottawa, Ill.	1.25–3.25	2.25–3.50	1.25–3.25	1.25–3.25	1.25	3.50	3.50
Red Wing, Minn. (a)	.....	.....	.....	.....	1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	.....
Utica and Ottawa, Ill.	.50– .65	.75– .90	.75–1.00	.75–1.00	.75–1.00	.....	1.00

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Dresden, Ohio	.....	1.00
Eau Claire, Wis.	4.30	.60–1.00
Montoursville, Penn.	.....	1.00
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25–3.25	1.25
Red Wing, Minn.	.....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	.....	1.75

Glass Sand

(Silica sand is quoted washed, dried and screened)

Cheshire, Mass., in carload lots	5.00–7.00
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	2.50–3.00

Bank Run Sand and Gravel

Appleton, Minn.†	.55
Algonquin, Ill.¶ (½-in. and less)	.30
Brewster, Fla. (sand, ¼-in. and less)	.40– .50
Burnside, Conn. (sand, ¼-in. and less)	.75*
Chicago, Ill., and Grand Haven, Mich.†	.92–1.20
Crystal Lake, Ill.¶ (½-in. and less)	.25
Des Moines, Ia. (sand and gravel mix)	.60–1.05
Fort Worth, Tex.¶ (2-in. and less)	.65
Gainesville, Tex.¶ (1½-in. and less)	.55
Gary and Miller, Ind.†	1.15–1.40a
Grand Rapids, Mich.¶ (1-in. and less.)	.55
Hamilton, Ohio¶ (1½-in. and less)	.50–1.00
Hersey, Mich.¶ (1-in. and less)	.50
Kalamazoo, Mich.	1.85b
Mankato, Minn.†	.70
Oregon City, Ore.—River run	1.00–1.50
Pueblo, Colo.—†River run sand	.50
Winona, Minn.†	.60
York, Penn.—Sand, 1/10-in. down	1.10

*Cubic yard. †Fine sand, 1/-10-in. down. (a) Cu. yd., delivered Chicago. (b) 1½ cu. yd. ¶Gravel.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.82½	3.30	4.30¶
Atlanta, Ga.	.....	2.19†	3.49¶
Baltimore, Md.	.....	2.26*	3.56¶
Berkeley, Calif.	.....	2.14	.....
Birmingham, Ala	.....	1.85†	3.15¶
Boston, Mass.	.47	1.88†	3.27¶
Buffalo, N. Y.	.61¼	2.05†	3.35¶
Butte, Mont.	.90¼	3.61	.....
Cedar Rapids, Ia.	.....	2.23*	.....
Centerville, Calif.	.....	2.14	.....
Charleston, S. C.	.....	a2.29†	3.26¶
Cheyenne, Wyo.	.61½	2.46	.....
Chicago, Ill.	.....	1.95*	3.25¶
Cincinnati, Ohio	.....	2.14*	3.44¶
Cleveland, Ohio	.....	2.04*	3.34¶
Columbus, Ohio	.....	2.17†	3.47¶
Dallas, Texas	.....	†1.90	3.49¶
Davenport, Iowa	.....	2.14*	.....
Dayton, Ohio	.....	2.12†	3.44¶
Denver, Colo.	.66¼	2.65	.....
Des Moines, Iowa	.48½	1.94	.....
Detroit, Mich.	.....	1.95*	3.25¶
Duluth, Minn.	.....	2.04*	.....
Fresno, Calif.	.....	2.33	.....
Houston, Texas	.....	†2.00	3.73¶
Indianapolis, Ind.	.54¾	1.99*	3.29¶
Jackson, Miss.	.....	2.29†	3.59¶
Jacksonville, Fla.	.....	b2.34†	3.26¶
Jersey City, N. J.	.....	2.13†	3.43¶
Kansas City, Mo.	.50½	2.02	3.22¶
Los Angeles, Calif.	.43	1.72	.....
Louisville, Ky.	.55½	2.12–2.15†	3.42¶
Memphis, Tenn.	.....	2.29†	3.59¶
Merced, Calif.	.....	2.01	.....
Milwaukee, Wis.	.....	2.10*	3.40¶
Minneapolis, Minn.	.....	2.27*	.....
Montreal, Que.	.....	1.60‖	.....
New Orleans, La.	.43	1.92†	3.22¶
New York, N. Y.	.50¾	2.03*	3.33¶
Norfolk, Va.	.....	1.97†	3.27¶
Oklahoma City, Okla.	.61½	2.46	3.66¶
Omaha, Neb.	.59	2.36	3.56¶
Peoria, Ill.	.....	2.12*	3.32¶
Pittsburgh, Penn.	.....	1.95*	3.25¶
Philadelphia, Penn.	.....	2.15*	3.45¶
Phoenix, Ariz.	.....	3.51	.....
Portland, Ore.	.....	2.50‡	.....
Reno, Nev.	.....	2.76‡	.....
Richmond, Va.	.....	2.32†	3.62¶
Sacramento, Calif.	.....	2.25	.....
Salt Lake City, Utah	.70¼	2.81	.....
San Antonio, Texas	.....		3.42¶
San Francisco, Calif.	.....	2.24‡	.....
Santa Cruz, Calif.	.....	2.10	.....
Savannah, Ga.	.....	a2.29†	3.16¶
St. Louis, Mo.	.48¾	1.95†	3.25¶
St. Paul, Minn.	.....	2.27*	.....
Seattle, Wash.	.....	1.50–1.75	†2.50c
Tampa, Fla.	.....	2.00†	3.41¶
Toledo, Ohio	.....	2.20*	3.50¶
Topeka, Kan.	.55¼	2.21	3.41¶
Tulsa, Okla.	.58¼	2.33	3.53¶
Wheeling, W. Va.	.....	2.02†	3.32¶
Winston-Salem, N. C.	.....	2.44†	3.54¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.	.....	2.15	.....
Bellingham, Wash.	.....	2.25	.....
Bonner Springs, Kan.	.....	1.85	.....
Buffington, Ind.	.....	1.70	.....
Concrete, Wash.	.....	2.65	.....
Davenport, Calif.	.....	2.05	.....
Hannibal, Mo.	.....	1.80	.....
Hudson, N. Y.	.....	2.00	.....
Independence, Kan.	.....	1.85	.....
Leeds, Ala.	.....	1.70	.....
Limedale, Ind.	.....	1.70	.....
Lime & Oswego, Ore.	.....	2.50	.....
Nazareth, Penn.	.....	2.15	.....
Northampton, Penn.	.....	1.75	.....
Richard City, Tenn.	.....	2.05	.....
Steelton, Minn.	.....	1.85	.....
Toledo, Ohio	.....	2.20	.....
Universal, Penn.	.....	1.70	.....
Waco, Tex.	.....	1.85	.....

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. ‡Subject to 2% cash discount. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. ‖Includes sales tax. (c) Quick-hardening "Velo."

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Farmington, Conn.	.60	1.30	1.30	1.00	1.00	.....
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.00
Jamesville, N. Y.	1.00	1.00	1.00	1.00	1.00	.....
Oriskany Falls, N. Y.	.50–1.00	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35	1.00–3.00
Prospect Junction, N. Y.	.50– .80	.....	1.00–1.15	1.00–1.10	1.00–1.10	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Hillsville, Penn.	.85	1.35	1.35	1.35	1.35	1.35
Shaw's Junction, Penn. (e)	.85	1.20–1.35	1.20–1.35	1.20–1.35	1.40	1.30–1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill. (b)	2.00	.....	2.00	.....	.....	.....
Afton, Mich.	.....	.....	.....	.25	.50– .75	1.50
Cypress, Ill.	.90	.90	.90	.90	1.00	1.15
Davenport, Iowa	1.20	1.50	1.50	1.30	1.30	1.30
Dubuque, Iowa	1.00	1.00	1.00	1.10	1.10	1.10
Dundas, Ont.	.50	.80	.80	.70	.70	.....
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	.....
Greencastle, Ind.	1.25	1.10	1.10	1.00	1.00	1.00
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
McCook, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.75–1.00	1.65–1.85	1.45	1.15	1.05	.95
Sheboygan, Wis.	1.00	1.00	1.00	1.00	1.00	1.00
Stone City, Iowa	.75	.....	1.10	1.00	1.00	1.00h
Toledo, Ohio	1.60	1.70	.....	1.60	.....	1.60
Toronto, Canada	2.50	3.00	2.50	2.50	2.50	2.50
Waukesha, Wis.	.....	.90	.90	.90	.90	.....
Wisconsin points..	.50	.....	1.00	.90	.90	.....
SOUTHERN:						
Cartersville, Ga.	1.15	1.35	1.35	1.15	1.00	1.00
Chico, Texas	.75	1.30	1.25	1.20	1.15	.....
Cutler, Fla.	.50r	1.75r	1.75r	1.75r	1.75r	1.50r
El Paso, Texas (v)	.75r	1.25	1.25	1.00	1.00	1.00
Graystone, Ala.	Crusher run stone 1.00 per net ton					
Olive Hill, Ky.	.50–1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.40	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.00	1.00	1.00	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Rock Hill, St. Louis Co., Mo.	1.30–1.40	1.30–1.40	1.10–1.40	1.30–1.40	1.30–1.40	1.30–1.40
Stringtown, Okla.	1.00	1.15	1.20	1.15	1.00	1.00

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Farmington, Conn.	1.00	1.30	1.30	1.00	1.00	.....
Duluth, Minn.	1.00	2.25	1.75	1.65	1.35	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.25	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	1.15	1.25	1.50	1.30	1.15	1.10
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.35	2.10	1.90	1.50	1.50	.....
Richmond, Calif.	.50	.....	1.00	1.00	1.00	.....
Toronto, Canada	4.70	5.80	4.05	4.05	4.05	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.....	.....	1.60	1.60	1.50	.....
Chicago, Ill.—Granite	2.00	1.70	.....	1.50	1.50	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.50	1.40	1.25	1.15	.....
Lohrville, Wis.—Granite	1.80	1.60	.....	1.50	1.50	.....
Middlebrook, Mo.—Granite	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Toccoa, Ga.—Granite	.50	1.35	1.35	1.25	1.25	1.20

(b) Wagonloads. (c) 1 in., 1.40. (d) 2-in., 1.30. (e) Price net after 10c discount deducted. (h) Rip rap. (n) Ballast, R. R., .90; run of crusher, 1.00. (q) Crusher run, 1.40; ¼-in. granlithic finish, 3.00. (r) Cu. yd. (t) Rip rap, 1.20–1.40 per ton. (v) Roofing stone, 1.50 per ton.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Allentown, Penn.	1.00–1.50	.40– .60	.80–1.00	.50– .80	.50– .80	.60– .80	.80
Bethlehem, Penn.	1.25–1.75	.50– .60	1.00–1.25	.60– .80	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.50	.70	1.00	1.15	1.15	1.15	1.15
Reading, Penn.	2.00	1.00	.....	1.00	.....	.....	.....
Swedeland, Penn.	1.50–2.50	.60–1.10	1.00–1.25	.90–1.25	.90–1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	.....
Jackson, Ohio	2.05*	.65*	1.80*	1.30*	1.05*	1.30*	.....
Toledo, Ohio	1.50	1.10	1.35	.135	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	2.05*	1.05*	1.80*	1.45*	1.45*	1.45*	.....
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1½-in. to ¼-in., 1.05; ⅝-in. to 10 mesh, 1.25*; ⅝-in. to 0-in., 90c*; ¼-in. to 10 mesh, .80*.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 99% $CaCO_3$; 0.3% $MgCO_3$, 90% thru 100 mesh **4.50**

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh 1.50

Carterville, Ga. 2.00

Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton 6.00

Gibsonburg, Ohio—Bulk, 2.25; in bags.... 3.70

Hillsville, Penn. 2.10–4.50

Jamesville, N. Y.—Bulk, 3.50; in 80-lb. bags **4.75**

Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh 3.50

Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk 2.50

Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton 2.00

Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh 4.25

Olive Hill, Ky., per ton 50–1.00

West Rutland, Vt. — Analysis, 96.5% $CaCO_3$; 1% $MgCO_3$, in 100-lb. burlap bags, per ton **4.50**

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98.44% $CaCO_3$; .83% $MgCO_3$; 90% thru 10 mesh 1.50

Cartersville, Ga.—50% thru 50 mesh..... **1.50**

Chico, Tex.—(Agstone, ⅛-in. down), per ton 1.00

Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder 3.50

Cypress, Ill. — Analysis, 96% $CaCO_3$; 90% thru 100 mesh, 1.25; 50% thru 100 mesh, 1.25; 90% thru 50 mesh, 1.25; 50% thru 50 mesh, 1.15; 90% thru 4 mesh, 1.25, and 50% thru 4 mesh 1.15

Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton **1.20**

Dubuque, Ia.—Analysis, 64.04% $CaCO_3$; 29.54% $MgCO_3$; 50% thru 100 mesh.... **1.00**

Dundas, Ont.—Per ton 1.00

Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh; bulk, per ton 1.15–1.50

Gibsonburg, Ohio—90% thru 10 mesh.... 1.00–1.50

Hillsville, Penn.—90% thru 100 mesh, 50% thru 100 mesh and 90% thru 50 mesh 1.00–4.50

Lannon, Wis. — Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00

Screenings (¼-in. to dust) 1.00

Marblehead, Ohio—90% thru 100 mesh.... 3.00

90% thru 50 mesh 2.00

90% thru 4 mesh 1.00

McCook and Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .80

Osborne, Penn.—100% thru 20 mesh, 60% thru 100 mesh, and 45% thru 200 mesh, per ton a5.00

Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags 3.50

Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh 1.15–1.70

Stone City, Ia.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk 100-lb. paper bags, 4.75; 100-lb., cloth.. 3.50 5.25

Waukesha, Wis.—90% thru 100 mesh, 3.50; 50% thru 100 mesh 2.10

*Less 25c cash 15 days. (a) Less 50c commission.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton.. 6.00

Hillsville, Penn.—Sacks, 5.10; bulk 3.50

Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh (bags extra) 3.50

Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk 2.25–3.50

Waukesha, Wis.—90% thru 100 mesh, bulk 3.50

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	11.40	.....	.....	17.50	.....	20.65
Knickerbocker, Devault and Rambo, Penn.*	.....	9.50b	9.50b	9.50b	8.00	9.50	8.50	.....
Lime Ridge, Penn.	.....	.....	8.50	.....	6.50	8.00[2]	4.50	.....
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.00	6.50	.....
Carey, Ohio	9.50	6.50	6.50	.....	8.00	.....	8.00	.....
Cold Springs, Ohio	.....	7.75	7.75	.....	.....	.....	7.00	.....
Gibsonburg, Ohio	10.50	.....	.....	.....	7.00	9.00[9]	.....	.....
Little Rock, Ark.	.....	14.40	.....	14.40	.....	.....	11.90	17.90
Luckey, Ohio*	10.50	7.75	7.75	.....	.....	.....	7.00	.....
Marblehead, Gibsonburg, Marion, Sandusky, Tiffin and White Rock, Ohio	10.50	7.75	7.75	11.00	7.00	9.00	7.00	.....
Milltown, Ind.	.....	9.00	8.25	9.50	7.50	.....	7.00	.....
Scioto, Ohio	10.50	6.50	6.50	7.50	.....	.....	6.00	.....
Sheboygan, Wis.	.....	10.50	10.50	.....	.....	.....	9.50	9.50
Wisconsin points	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio	10.50	7.75	7.75	11.50[24]	7.00	9.00[9]	7.00	11.50‖
SOUTHERN:								
Cartersville, Ga.	.....	9.00	.....	.....	.....	13.50	.....	15.00
Graystone, Ala.*	12.50	9.00	.....	12.50	.....	.....	7.50	.....
Keystone, Ala.	17.00	9.00	.....	7.00– 9.00	.....	.....	5.00a	14.85
Knoxville, Tenn.	20.00	9.00	9.00	7.50	7.50	.....	7.50	27.00
Ocala, Fla.	.....	10.50	.....	.....	.....	.....	.....	.....
Pine Hill, Ky.	.....	9.00	8.00	9.00	.....	.....	.....	12.50
WESTERN:								
Colton, Calif.	.....	.....	.....	.....	9.50[4]	.....	.....	.....
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	20.00
Los Angeles, Calif.	.....	.....	.....	.....	.....	.....	12.00	.....
San Francisco, Calif.†	16.00	14.00	6.00–12.00	14.00–19.00	14.50[20]	.....	11.00[19]	.....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[20]	.....	11.00[19]	.....

[1]Also 6.00. [2]To 1.35. [3]In 100-lb. bags. [4]To 11.85 per ton, granular but not ground, ¾-in. screen down to 14 mesh. [9]In 80-lb. paper. [19]Per bbl. [11]In wood; in steel, 11.60. [24]Less credit for return of empties. [19]To 14.50. [20]Also 13.00. [24]Superfine, 92.25% thru 200 mesh. *Price to dealers. †Wood-burnt lime: finishing hydrate 20.00 per ton, pulv. lime 2.00 per iron drum. Oil-burnt pulv. lime, 13.00–14.50 per ton. ‡To 6.00. ¶To 13.50. (a) To 8.50. (b) In bags.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 100% thru 200 mesh, 7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton. Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue-black, 6.00 per ton in bulk, plus 10c per bag.

Roofing Slate

City or shipping point:	Prices per square—Standard thickness. 3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—						
Buckingham oxford grey	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear	10.00–14.00	20.00	25.00	29.00	40.00	50.00
No. 1 ribbon	9.00–10.25	16.00	20.00	25.00	35.00	46.00
Gen. Bangor No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
No. 1 Albion	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Chapman Quarries, Penn.	7.75–11.25	13.00–15.00	19.00–22.00	23.00–28.00	27.00–30.00	32.00–35.00
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Pen Argyl, Penn.						
Graduated slate	.....	.....	16.00	23.00	27.00	37.00	46.00
No. 1 clear (smooth text)	7.25–10.50; Albion-Bangor medium, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mt., No. 1 & No. 2 clear	8.00– 9.50	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:	
Crude talc, per ton	5.00
Ground talc (20-50 mesh), bags	6.50
Ground talc (150-200 mesh), bags	9.00
Pencils and steel crayons, gross	1.50– 2.00
Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¼% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh	7.50– 8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.	
Clifton, Va.:	
Ground talc (150-200 mesh), in bags	10.00
Conowingo, Md.:	
Crude talc, bulk	4.00
Ground talc (150-200 mesh), in bags	14.00
Cubes, blanks, per lb.	.10
Emeryville, N. Y.:	
Ground talc (200 mesh), bags	13.75
Ground talc (325 mesh), bags	14.75
Hailesboro, N. Y.:	
Ground talc (300-350 mesh), in 200-lb. bags	15.50–20.00
Henry, Va.:	
Crude (mine run), bulk	3.50– 4.50
Ground talc (150-200 mesh), bags	6.25– 9.75
Joliet, Ill.:	
Ground talc (200 mesh) in bags:	
California white	30.00
Southern white	20.00
Illinois talc	10.00
Los Angeles, Calif.:	
Ground talc (150-200 mesh), in bags	15.00–25.00
Natural Bridge, N. Y.:	
Ground talc (325 mesh), bags	10.00–15.00

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock	
Gordonsburg, Tenn.—B.P.L. 65-70%	3.50– 4.00
Mt. Pleasant, Tenn.—B.P.L. 76-78%	6.75
Ground Rock (2000 lb.)	
Gordonsburg, Tenn.—B.P.L. 65-70%	3.75– 4.25
Mt. Pleasant, Tenn.—Lime Phosphate: B.P.L. 73.25%	11.80
Mt. Pleasant, Tenn.—B.P.L., 72%	5.00– 5.25

Florida Phosphate

(Raw Land Pebble)

Mulberry, Fla.—Gross ton, f.o.b. mines	
68/66% B.P.L.	3.15
70% minimum B.P.L.	3.75
72% minimum B.P.L.	4.25
75/74% B.P.L.	5.25
77/76% B.P.L.	6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	100.00–125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, Bristol and Cardigan, N. H.—Per ton:	
Punch mica, per ton	150.00–240.00
Mine scrap	22.50
Mine run	325.00
Clean shop, scrap	25.00
Roofing mica	37.50
Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh	60.00
Spruce Pine, N. C.—Mine scrap, per ton	20.00
Trenton, N. J.—Mine scrap, per ton, f.o.b. mines	20.00

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Blue Rapids, Kan.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Centerville, Iowa	.....	.....	6.00	7.00	.....	7.50	8.50	10.50a	.....	.....	.....	.....	.....
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton, floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.													
Fort Dodge, Iowa	2.50	6.00	6.00	7.00	9.00	9.00	11.50	8.00	16.00	20.00	15.00	.....	25.00
Grand Rapids, Mich. (h)	.....	.....	7.00	9.00	9.00d	9.50d	19.50	8.00d	26.00	20.00d	.....	.....	25.00
Los Angeles, Calif. (b)	3.90	7.00–9.00	7.00–9.00	7.50–9.00	8.00–10.00	.....	8.00–10.00	.....	30.00c	.....	.....	.....	.....
Medicine Lodge, Kan.	1.40	.....	.....	.....	.....	.....	11.50d	.....	16.00d	.....	.....	.....	.....
Oakfield, N. Y.	3.00	.....	.....	6.00	9.00d	9.00d	.....	6.00	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	9.00	9.00	9.00	20.00	8.00	25.50	20.00i	.....	15.00	25.00
Portland, Colo.	.....	7.00	7.00	9.00	9.00	9.50	9.00	.....	27.50	.....	22.50	27.50	.....
Portland, Ore.	7.50	.....	11.50d	16.00d	.....	.....	.....	.....	.....	.....	.....	.....	.....
Providence, R. I. (x)	.....	.....	.....	12.00–13.00e	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	6.00	.....	10.20d	13.90d	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.60	.....	10.00d	14.00d	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00g	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) White molding. (b) Plasterboard, ¼x32x36-in., 14c-17c per sq. ft.; ⅜x32x36-in., 15c-18c per sq. ft. (c) To 40.00. (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (g) ½x48-by 3 to 4 ft. long. (h) Gypsum lath, per M sq. ft., 15.00. (i) To 26.00. (x) "Fabricaste" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plant, 7¼c-8¼c. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, 12.00 per ton in bags; bulk, per ton		7.50
Crown Point, N. Y.—Mica Spar		¶9.00–‖12.00
Davenport, Iowa — White limestone, in bags, per ton	‖6.00	‖6.00
Harrisonburg, Va.	12.50–14.50	
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt. — Middlebury white		¶9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		c5.50
Phillipsburg, N. J.		15.00–18.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Tuckahoe, N.Y.—Tuckahoe white	7.00	
Warren, N. H. (d)		¶8.00– 8.50
Whitestone, Ga.		10.00

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50–15.00 per ton in 100-lb. bags.

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton	18.00

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140 mesh (bulk)	19.00
Keystone, S. D.—Color, white; analysis, K_2O, 12.30%; Na_2O, 2.28%; SiO_2, 64%; Fe_2O_3, .05%; Al_2O_3, 19.50%, pulverized, 100% thru 140 mesh, in bags, 16.00; bulk	15.00
Coatesville, Penn.—Color, white, analysis, K_2O, 12.30%; Na_2O, 2.86%; SiO_2, 66.05%; Fe_2O_3, .08%; Al_2O_3, 18.89%; crude, per ton	8.00
Erwin, Tenn.—White; analysis, K_2O, 10.50%; Na_2O, 2.76%; SiO_2, 67.92%; Fe_2O_3, .07%; Al_2O_3, 18%, pulverized, 99% thru 200 mesh, in bags, 16.20; bulk	15.00
Crude, in bags, 8.20; bulk	7.00
Rumney and Cardigan, N. H. — Color, white; analysis, K_2O, 9-12%; Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Rumney Depot, N. H.—Color, white; analysis, K_2O, 8-13%; Na_2O, 1-1½%; SiO_2, 61-68%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk (bags, 15c extra)	18.00

Cement Drain Tile

Graettinger, Iowa — Drain tile, per foot; 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Grand Rapids, Mich.—Drain tile, per 1000 ft.	
4-in.	36.00
5-in.	48.00
6-in.	66.00
8-in.	100.00
10-in.	150.00
12-in.	210.00
Longview, Wash.—Drain tile, per 100 ft.	
3-in.	5.00
4-in.	6.00
6-in.	10.00
8-in.	15.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	10.00

Chicken Grits

Centerville, Iowa	9.25
Cypress, Ill.—(Agstone)	1.15
Belfast, Me.—(Agstone), per ton, in carloads	10.00
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per 100-lb. sack	1.00
Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each	8.00
Cranberry Creek, N. Y.—Per ton, in carload lots, in bags, 9.00; bulk, 7.50. Less than carload lots, in bags	12.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton	6.00
El Paso, Tex.—(Limestone), per 100-lb. sack	.75
Los Angeles, Calif.—(Gypsum), per ton, including sacks	7.50– 9.50
Middlebury, Vt.—Per ton (a)	10.00
Randville, Mich.—(Marble), bulk	6.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	‖7.50–‖9.00
Wisconsin points—(Limestone), per ton	15.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis. (at plant)	9.50
Dayton, Ohio	12.50–13.50
Detroit, Mich. (d)	13.00–15.50
Farmington, Conn.	**16.00**
Flint, Mich.	*14.00–15.50b
Grand Rapids, Mich.*	**14.50**
Iona, N. J.	**12.00**
Jackson, Mich.	**13.00**
Madison, Wis.	**12.50a**
Milwaukee, Wis.	**13.00***
Minneapolis, Minn.	10.00*
Mishawaka, Ind.	**11.00**
New Brighton, Minn.	**8.00**
Pontiac, Mich. (e)	**15.50**
Portage, Wis.	**15.00**
Rochester, N. Y.	**19.75**
Saginaw, Mich.	**13.50**
San Antonio, Texas	12.00
Sebewaing, Mich. (at yard)	12.50
South River, N. J.	11.00
South St. Paul, Minn.	**9.00**
Syracuse, N. Y.	**18.00–20.00**
Toronto, Canada	12.00–b13.00*
Winnipeg, Canada	**15.00**

***Delivered on job. (a) Less 50c disc. per M 10th of month. (b) 5% disc., 10 days. (c) Delivered in city. (d) Also 12.00. (e) Truck delivery.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Appleton, Minn.	18.00–20.00
Franklin Park, Ill.:	
8x8x16. Per 1000	180.00
Chicago, Ill.:	
8x 8x16. Each	.21†
8x 8x16. Each	.18h
8x10x16. Each	.25†
8x10x16. Each	.22b
8x12x16. Each	.28†
8x12x16. Each	.25b
Columbus, Ohio: 8x8x16	14.00b–16.00a
Forest Park, Ill.	21.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Lexington, Ky.:	
8x8x16	a18.00*
8x8x16	b15.00*
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*

*Price per 100 at plant.
†Rock or panel face.
(a) Face. (b) Plain. (c) Common.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Clyde, Ill.—French tile, 8½x15 in., per sq., 9.50–12.00; Spanish, 8½x15 in., per sq., 10.00–12.00; English Shingle, 7¼x12½ in., per sq., 13.50–15.50; Closed End Shingle, 8x12½ in., per sq.	11.00–13.00
Detroit, Mich.—5x8x12, per M	67.50
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	**10.00**
Red	**11.00**
Green	**13.00**
Lexington, Ky.—8x15, per sq.:	
Red	**15.00**
Green	**18.00**
Longview, Wash.:	
4x6x12-in., per 1000	55.00
4x8x12-in., per 1000	65.00

Cement Building Tile

Chicago District (Haydite):	
8x 4x16, per 1000	**140.00**
8x 8x16, per 1000	**200.00**
8x12x16, per 1000	**300.00**
Columbus, Ohio:	
5x8x12, per 100	**6.00**
Lexington, Ky.:	
5x8x12, per 1000	55.00
4x5x12, per 1000	35.00
Longview, Wash. (Stone Tile):	
4x6x12, per 1000	**57.50**
4x8x12, per 1000	**65.00**

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	
Chicago District "Haydite"	14.00	
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	10.00–13.00a	
Forest Park, Ill.		37.00
Longview, Wash.	16.50	23.00– 40.00
Milwaukee, Wis.	14.00	22.00
Omaha, Neb.	18.00	30.00– 40.00
Philadelphia, Penn.	15.50	
Portland, Ore.	12.00	22.50– 55.00
Prairie du Chien, Wis.	14.00	22.00– 25.00
Rapid City, S. D.	18.00	25.00– 40.00

(a) Delivered on job; 10.00 f.o.b. plant.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.		53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.		55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.		60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% discount.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10-in.	12-in.	15 in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich. (b)																	
Sewer	.....	.12	.18	.27½	.35	.47	.92½	1.11	.....	1.66½	2.47	2.73⅓	.....	.....	.....	.....	.....
Culvert	.....	.....	.....	.57	.67	.93	1.20	.....	.....	1.80	2.10	2.25	3.35	4.00	5.60	6.90	7.85
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Newark, N. J. (d)	.....	.....	.....	.....	.90	1.15	1.50	.....	.....	1.85	2.35	2.76	3.77	4.93	6.21	7.66	9.28
Unreinforced	.....	.16	.25	.38	.48½	.65	.90	.....	.....	1.62	.....	.....	.....	.....	.....	.....	.....
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Tacoma, Wash.	.14	.16	.22	.32	.45	.64	.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (c)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31

(a) 24-in. lengths. (b) Sewer, 21-in., 1.48; culvert, 21-in., 1.45. †21-in. diam. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced; 21-in., 1.69; unreinforced, 21-in., 1.26; 5% cash discount.

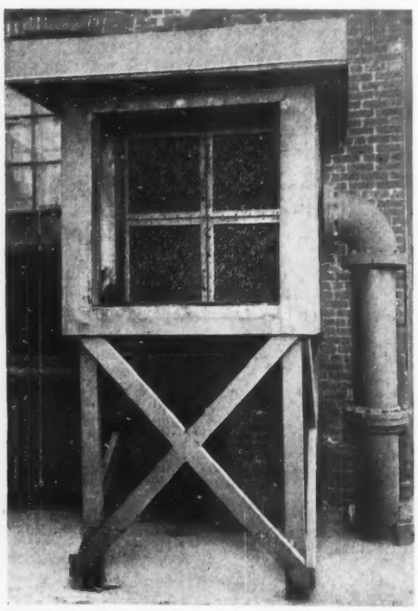
Filtered Air for Cement Plants

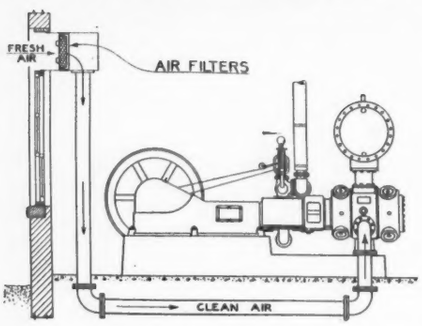
Prolonging the Life of Equipment and Increasing the Efficiency of Workers in Cement Plants

By Orville Adams
Dallas, Tex.

ENGINEERS AND DESIGNERS of rock products plants appreciate the importance of economy and efficiency made possible by the application of air filters to air compressors, generators, motors and building ventilation. Numerous portland cement mills, which include many of the largest and best known in the country, have complete installations of air filters.

A means of reducing expenses for maintenance, as well as increasing the efficiency of the personnel, is brought about by the use of air filters, for plants with this equipment report definite savings in production cost as one of the many benefits. A study of the problem shows cost of air filters indeed small in proportion to the benefits derived. The equipment protected by the use of filters cost many hundred times the cost of filters.





Filter application for an air compressor and diagram of installation

In addition to first cost comparisons, the increased productivity which results from the improved sanitary conditions is far more important, and is assuming such a status in connection with health and safety work as to make the consideration of air filters a matter of prime importance. There are, doubtless, few other industries where the uses of air filters are so many and so important as the cement field. While there are many applications that differ with individual plants, there are practically four general applications that may be found where there is a complete cement production unit.

Air Compressors Require Filters

In all plants with quarries, there is urgent need for filters in connection with compressors that supply air for quarry drills, and all other pneumatic devices. When used on compressors the air filter not only positively prolongs the life of the compressor itself by eliminating a great deal of cleaning, valve grinding and cylinder reboring, but its application also prolongs the life of the drills, motors, and aids in the better performance of this equipment.

In wet process plants all of the above applications exist plus an additional use in cleaning air passing through compressors and used for agitating slurry before it is fed to the kilns, and in many plants for pumping slurry to the kilns.

It has been noted that the amount of compressed air necessary for the production of 1000 bbl. of cement a day ranges between 500 and 1000 cu. ft. per minute. Therefore the filter requirements cover a capacity for maximum economy in the production of at least 1000 c.f.m. for every 1000 bbl. of cement produced. There is equipment now available for compressors which can be manually cleaned or automatic self-cleaning types. There has also been developed special equipment for this work, adapted to the air intake of compressors.

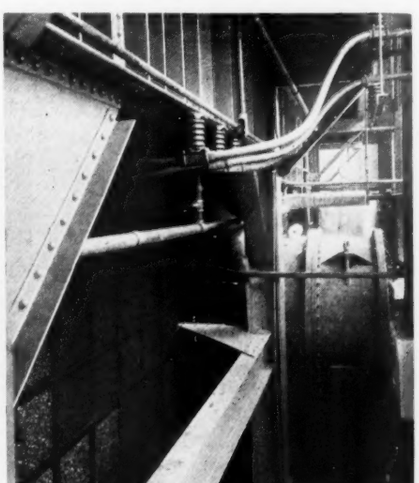
Turbo Generators, Mill Motors and Other Electrical Equipment

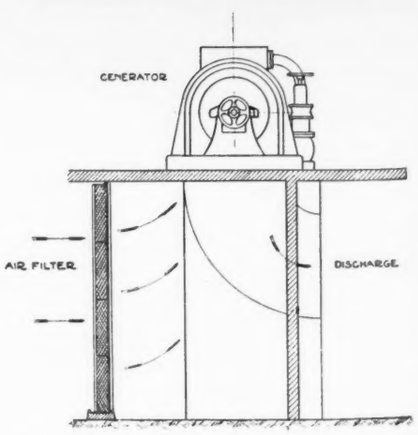
Turbo generators and mill motors are dependent upon cleanliness of the air for their efficiency and operating satisfaction, adequate air cooling and clean coils. Filters are used to advantage for cleaning the air used for this purpose, and greatly reduce the cost of cleaning, in maintaining maximum efficiency, in eliminating the danger of burn-outs, short circuits and other dangers due to the deposit of dust from the cooling air.

The high labor cost and danger of damaging the insulation in the old fashion method of periodic hand cleaning—which was never a sure method of eliminating all the dust—is obviated when filters are employed for this application. Cooling air for electrical equipment conditioned by filters has proven to be the most economical and efficient of all other methods proposed.

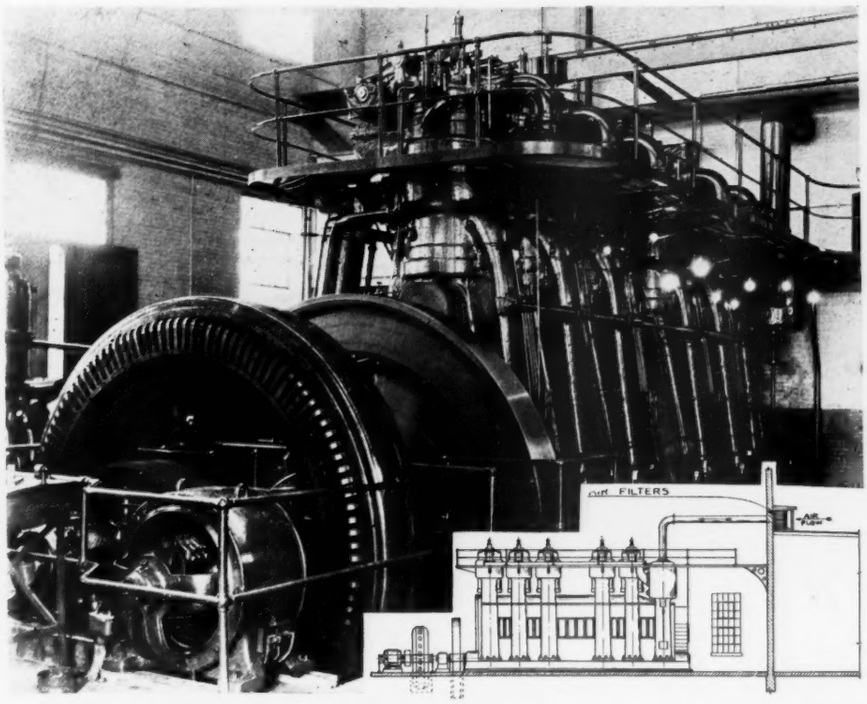
Diesel and Gas Engines

Wherever Diesel and gas engines are used for power generation, the maintenance cost can be materially reduced if the intake air is adequately filtered. The most noticeable example of economy is effected in valve grinding, cylinder reboring, and where gen-





Layout of the ventilating system for a generator, as shown above



Valve grinding cost was cut in half and liner replacement reduced one-third by the application of filters to this Diesel engine. Diagram shows installation

eral up-keep is involved.

It has been found that the so-called carbon deposits are not altogether carbon deposits, but incombustible particles of dust which are carried into the cylinder and mixed with the lubricating oil, forming gummy deposits which eventually become baked into a hard deposit on the head of the piston and around the combustion chambers as well as valves and valve seats.

William K. Gregory, Reid Air Filter Co., speaking before an American Society of Mechanical Engineers' meeting, in a discussion of this matter, stated: "In addition to causing unnecessary wear on pistons, piston rings, cylinder liners and bearings, dust is responsible for nine-tenths of the valve trouble. Furthermore, an analysis of so-called carbon deposits removed from cylinder heads show that over 90% of it is dust that has been absorbed by lubricating oil and baked into a hard deposit by the heat of combustion." He also stated that more than 90% of the engine manufacturers are recommending air filters, at least for engines operating under the severe conditions of dust, and cited cement plants as an example.

In one plant a survey was made of two 1250-hp. Diesel engines where the air supply formerly carried much dust and sand. The filters were installed for the purpose of reducing time down for maintenance and reducing the cost of valve grinding and liner replacement.

The results were that the valve grinding interval was increased from 1500 to 3000 hours, with a saving in direct cost as well. The liner life was increased from 3 to 4 years and perhaps more, with a considerable direct saving. The filter showed a direct saving in the form of a net return on the investment of 34% a year.

The danger of dust mixing with the lubricating oil and hence being highly abrasive with a tendency to shorten the life of equipment is practically eliminated with the use of air filters. There are both manually cleaned and the automatic self-cleaning types available for this work. Either of the standard units is used in a sufficient number of banks of units for larger engine installation. In no other place is filtering so beneficial as in the rock products plant, which operation from the very nature of work done, is surrounded with dusty air.

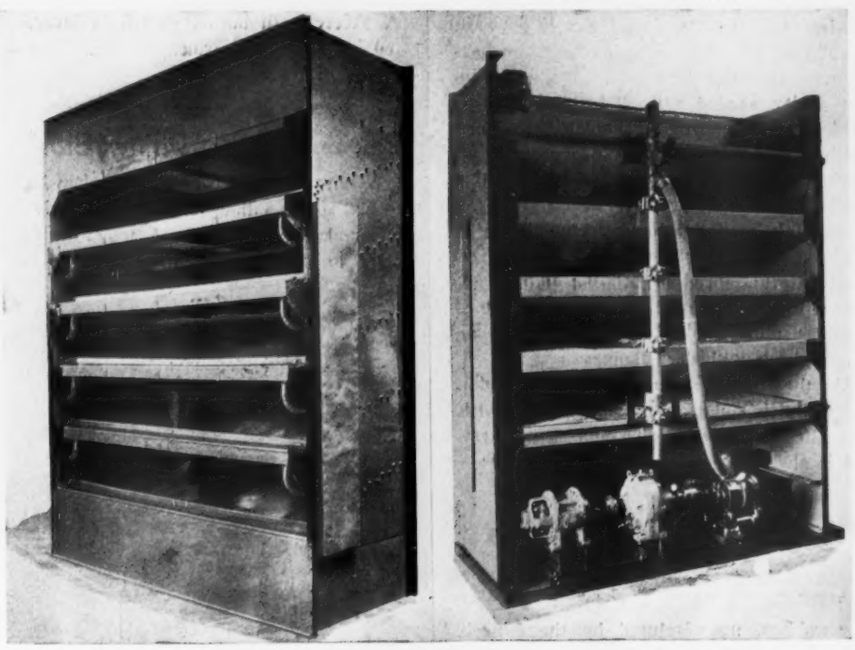
Offices, Laboratories and Cafeterias

The many other uses for filtered air in cement plant ventilation are obvious. The most important are in the chemical laboratories, the lunch room and offices. Nearly all the cement plants operate a laboratory, and in all such laboratory applications, there is a most urgent need for clean air. The small cost of filters for protecting laboratories is insignificant in comparison with benefits realized.

Offices, too, require clean air ventilation methods. The efficiency of office workers is reported to have been materially increased by ridding the air of heavy dust content which surrounds some cement plants, whether dry or wet process.

Many of the larger mills which operate their own lunch rooms or cafeterias will find the installation of air filters a great advantage. Some of the advantages of this type of application may be seen at the well known Universal plant at Buffington, Ind., which is so equipped with filters for ventilating the lunch room. After a limited study of this subject, it has been found that there are already a hundred or so such air filter installations in cement plants, rock plants, lime plants and the like.

In the accompanying photographs are shown several typical installations where air filters are employed to a great advantage, applications required in many cement plants. The writer is indebted to the Reid Air Filter Co., at Louisville, Ky., and the Mid-West Manufacturing Co., Bradford, Penn., for many of the photographs presented.



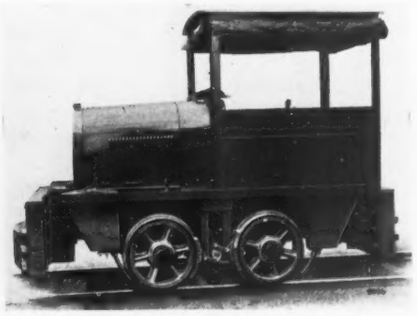
Front and rear views of a typical automatic air filter model, the flushing mechanism being shown at the right

New Machinery and Equipment

Locomotives for Light Haulage

THE BROOKVILLE LOCOMOTIVE CO., Brookville, Penn., has announced two new series of Ford powered locomotives, in 2-, 2½-, 3-, 3½- and 4-ton sizes for light locomotive haulage. It is asserted that the capacity and performance of these locomotives, which are equipped with the new Ford "AA" truck power plant, are greater than one would expect from such small and inexpensive units.

Maximum mobility and power are attained, it is claimed, with a minimum of motor wear



New locomotive designed for light haulage

and effort by the use of a 4-speed heavy-duty Ford transmission, in conjunction with a Brookville reverse drive, which latter makes all four forward speeds available in either direction.

According to the manufacturer, in low gear the Ford "AA" motor, which develops 40 hp. at 2200 r.p.m., is sufficiently powerful to slip all four drive wheels of a 4-ton locomotive, equipped with steel tires, operating on a dry sanded rail, and the steel tires which are supplied as standard equipment with these Brookville locomotives are claimed to provide 25% more traction than ordinary chilled face drivers.

In high gear this same locomotive, it is claimed, will attain a speed of 15 miles per hour, at this speed negotiating light trackage without derailment, due, it is maintained, to the use of Brookville spring journals and wide wheels with deep flanges.

As the entire Ford power plant, including Ford clutch and transmission, is used without alteration, inexpensive and expert service is always available from Ford dealers.

Improved Welders Feature Unified Control

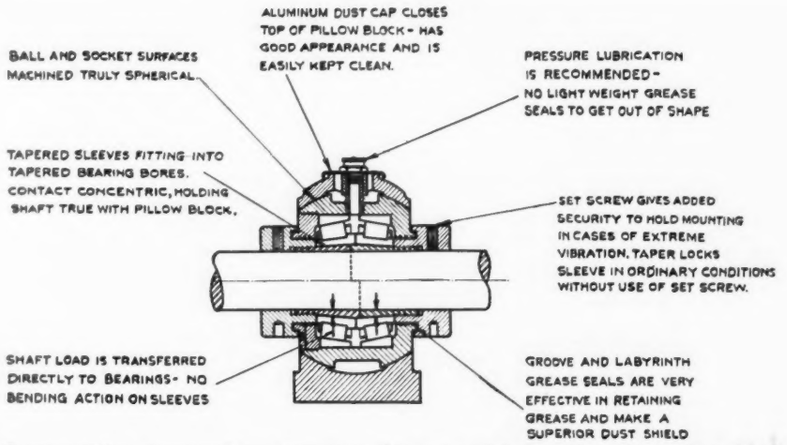
NEW IMPROVED Lincoln "Stable-Arc" welders, manufactured by the Lincoln Electric Co., Cleveland, Ohio, have recently been placed on the market. Many new features of design and construction increasing the stable arc features are said to have been introduced in the new machines.

The unification of the controls of both motor and generator is one of the outstanding features by which the simplicity of the operation of the welder has been increased, according to its makers.

The use of a combined voltmeter and ammeter, known as a volt-ammeter, makes possible the reading of amount of voltage and amperage on one dial.

Terminals for the lead cables are equipped with winged nuts, a feature which makes quick and easy connections possible, and also eliminates the necessity of a switch for reversing polarity.

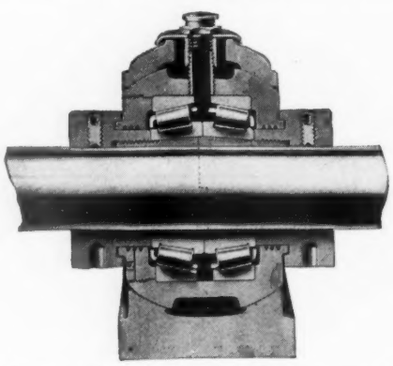
A safety push button switch is incorporated in the control panel for starting and stopping of the welder.


ALUMINUM DUST CAP CLOSES TOP OF PILLOW BLOCK - HAS GOOD APPEARANCE AND IS EASILY KEPT CLEAN.
BALL AND SOCKET SURFACES MACHINED TRULY SPHERICAL.
PRESSURE LUBRICATION IS RECOMMENDED - NO LIGHT WEIGHT GREASE SEALS TO GET OUT OF SHAPE
TAPERED SLEEVES FITTING INTO TAPERED BEARING BORES. CONTACT CONCENTRIC, HOLDING SHAFT TRUE WITH PILLOW BLOCK.
SET SCREW GIVES ADDED SECURITY TO HOLD MOUNTING IN CASES OF EXTREME VIBRATION. TAPER LOCKS SLEEVE IN ORDINARY CONDITIONS WITHOUT USE OF SET SCREW.
SHAFT LOAD IS TRANSFERRED DIRECTLY TO BEARINGS - NO BENDING ACTION ON SLEEVES
GROOVE AND LABYRINTH GREASE SEALS ARE VERY EFFECTIVE IN RETAINING GREASE AND MAKE A SUPERIOR DUST SHIELD

Cross-section enumerating important features of ball and socket pillow block

Ball and Socket Pillow Block

AN improved and perfected Timken ball-and-socket pillow block, designed to fit any standard shafting, from 1 7/16-in. diameter to the largest size, without special fittings or the use of appliances, is announced by Link-Belt Co., Chicago, Ill.



Cross-sectional view of ball and socket pillow block

These pillow blocks use pressure lubrication, and it is claimed they are practically dust-tight. The grease is forced in at the center and out at the shaft openings, and with the addition of the grease seal at the top, dust and grit are kept out of the bearing, and the grease stays inside the bearing where it belongs.

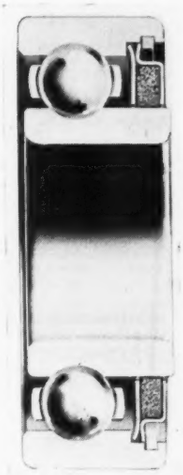
Pillow block designed to fit any standard shafting

Stocks of these pillow blocks are now maintained by the company at strategic distributing points throughout the country.

Felt Seal Ball Bearing

A NEW PATENTED felt-seal ball bearing has been developed by S K F Industries, Inc., New York City. The felt seal is provided as an integral part of the bearing, thus making it necessary for the machine manufacturer to provide only one housing enclosure. The outer and inner races as well as the balls in this bearing are made of high

carbon, chrome alloy steel hardened throughout. The bore and outside diameter are ground to international standard dimensions and tolerances, the same as the corresponding standard single row bearings. The width, however, is slightly greater than the standard dimension of a single row bearing in order to accommodate the felt seal. The tolerances on eccentricity of the outer and inner races are also international standard tolerances for single row ball bearings. The inner race projects a little beyond the face of the seal in order that the bearing may be pulled off the shaft at any time without the possibility of damaging the seal plates.



Felt seal ball bearing

The seal consists of an inner steel plate which is dished at its periphery and bears against a shoulder formed on the outer race. A removable felt of substantial size comes next, then a dished steel end plate, after which a split steel ring is fitted into a groove in the outer race to hold the assembly in place. The cross-sectional view shown here gives an idea of the construction and the relation of the various parts.

An outstanding feature claimed for the design is the ease with which the seal may be disassembled at any time and new felts applied. To disassemble the seal, it is merely necessary to spring the split steel ring out of the groove in the outer race, after which all the other component parts of the seal may be readily lifted out.

The bearing is available in sizes that are applicable to a wide range of small mechanical equipment, such as fractional horsepower and small motors, portable tools and other light equipment.

Manganese Steel Plate for Dipper Doors

THE ACCOMPANYING ILLUSTRATION shows a dipper door made of manganese-steel plate manufactured by the Manganese Steel Forge Co., Philadelphia, Penn., for one of a number of 4-yd. shovels used by the Dolese and Shepard Co. in its quarrying operations at the company's crushed stone plant near Chicago, Ill.

The stone from this quarry operation is a limestone, and although explosives are used to break it up, the pieces handled are fairly heavy and large. Formerly, it is said, this caused a great deal of breakage, as well as wear, on the dipper doors, and necessitated frequent replacements, together with shutdowns of the shovels while the dippers were being repaired. The difficulty has been solved, it is claimed, by equipping the dipper doors with manganese-steel plate.

The main part of each dipper door is made of two pieces of manganese-steel plate 53 in. square and ½ in. in thickness. These pieces are joined together by countersunk rivets and then riveted to the hinge arms. The end portion of each door is reinforced with a ¾-in. liner made of two pieces of ⅜-in. "Rol-Man" manganese-steel plate.

Since equipping the first dipper with this plate several of the shovels operated by the crushed stone plant have been fitted out in the same manner, and it is maintained by the manufacturer that some of them have been operated over a year without requiring replacements.

Dipper door of manganese steel plate

Aluminum Bodies for Motor Trucks

ALUMINUM, the light weight, rust-resisting metal first used for pots and pans and then applied in quick succession to the manufacture of a thousand and one products where these two outstanding qualities were paramount, is now being shaped into bodies and tanks for motor trucks.

Aluminum-bodied truck used by Manegold Stone Co., Milwaukee

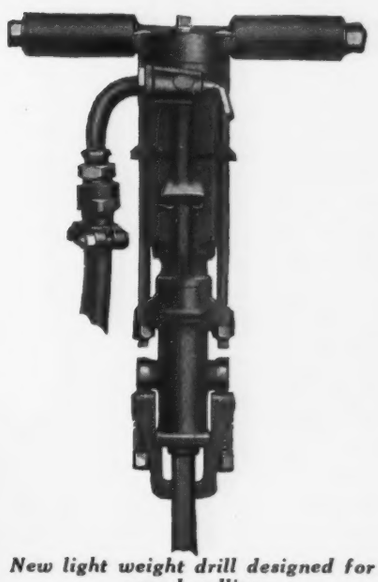
The body equipment illustrated is made of aluminum and produced by the Heil Co., Milwaukee, Wis. It is mounted on a Sterling chassis and these trucks are giving excellent service for the Manegold Stone Co., at Milwaukee, according to William R. Manegold, president and general manager. Briefly, the outstanding features of aluminum are: one-half the weight of steel, permitting a 20% additional payload capacity; paint is not required to protect the metal, as aluminum is rust-resisting; the salvage value of aluminum is from 12 to 14 cents per pound, which amounts to considerable on a worn tank or body.

The initial cost of aluminum is more than steel and it is probably this fact that has limited its use for dump bodies and truck tanks. However, upon analyzing the proportional savings, in many cases the additional first cost is more than repaid by the extra payload capacity obtained, according to Mr. Manegold.

New Light Weight Drill

A NEW LIGHT weight drill has been developed by the Cleveland Rock Drill Co., Cleveland, Ohio. The new drill is designated as the Cleveland H6, and specifications are as follows: Length over all, 21½ in.; weight, 32 lb.; bore and stroke, 2⅜ in. by 2⅜ in.

While the manufacturers state that the lighter drill will not cut as much as the heavier H7 drill, which is designed for drilling to depths of 25 ft., they claim that it cuts remarkably fast by comparison, keeps the steel turning around and really blows the hole better than some of the much larger machines, thus promoting fast cutting.



New light weight drill designed for easy handling

Air pressure recommended is 70 to 80 lb. gage, and it is stated that two H6 drills can be run from a compressor of 100 to 120 cu. ft. capacity.

Florida Phosphate Rock in Demand

(An editorial in the *Florida Times Union* of Jacksonville, Fla.)

MINING and exporting phosphate rock, an industry in Florida that was almost checked during the World War, and only slowly recovered its importance, is now attracting greater attention than ever before. The completion of a huge, new elevator by the Atlantic Coast Line, at Port Tampa, recently, attracts considerable notice in the business world, and properly, as it suggests greater development of this important feature of Florida's mining activities and increase in the wealth of the state through utilization of natural resources. The wealth underground in Florida is probably much more extensive than yet understood, although phosphate mining is among the well-established industries. Discovered at easily reached depths in Florida a comparatively few years ago, the mining and export of 80% of the world supply of this valuable mineral is now a fact.

Within the past few years the demand and supply have increased steadily and giving employment to many workers and bringing millions of dollars into the state, the matter of transportation and shipment of phosphate rock has become an important item. The terminal just completed and set in operation at Port Tampa is remarked as having cost $200,000, and its possibilities for rapid handling of big cargoes are declared to be notable. Constructed on modern plans and operated electrically, the new elevator will load large vessels quickly and economically. The comment from that section indicates the necessity for providing this up-to-date terminal with every facility for speed and convenience as the result of rapidly increasing demands for phosphate rock and the larger ships coming in for cargoes.

The new elevator is constructed on the north side of the Port Tampa ship channel, and it is remarked that the first ship to load at the elevator was the Japanese freighter *Hasu Maru,* which has now sailed for Japan with a large cargo of rock—to be used by the industrious farmers of Nippon after it has been mixed with other ingredients that go to make up the best of fertilizers. The correspondent telling of the completion of the big elevator says that the Atlantic Coast Line has for many years operated the largest phosphate terminals in the world at Port Tampa. Shipments from this port and from the port of Tampa, which is served by the Seaboard phosphate loading equipment, constitute more than half of the total tonnage out of Florida.

Phosphate deposits underlie Florida in a number of counties, and are known to exist in a belt that extends nearly across the state, with estimated resouces of more than 200,000,000 tons. The shipments in 1928 were valued at more than $12,000,000, and it is especially significant to know that the increase in mineral products for the South in 28 years was more than 1300%, the South having over a third of the total for the country. Improvements such as noted at Port Tampa show very forcibly the expansion of this valuable industry, and suggests still greater increase in production and export.

Agstone Buffalo Meet

SUPPLEMENTING THE BRIEF mention of the annual meeting of the National Agricultural Limestone Products Association held at the Hotel La Fayette, Buffalo, N. Y., in our last issue, we are able to report the following in attendance:

Solvay Sales Corp., Syracuse, N. Y., J. H. Kaiser.

Solvay Sales Corp., Charlotte, Mich., Claire Taylor.

Mohawk Limestone Prod., Mohawk, N. Y., Scott Wuichet.

Eastern Rock Products, Utica, N. Y., A. S. Owens.

Michigan Limestone and Chem., Buffalo, N. Y., J. N. Jerrigan, C. T. Stanage, H. G. Farber and Milton Lafferty.

Columbia Products Co., Barberton, Ohio, W. W. Bolton.

France Stone Co., Toledo, Ohio, Leo Poorman.

Ohio Hydrate and Supply Co., Gibsonburg, Ohio, Frank Coombs.

Colgan Limestone Products Co., Columbus, Ohio, Del Crowner.

Gouverneur Limestone Co., Gouverneur, N. Y., H. H. Hoskins.

General Crushed Stone Co., Syracuse, N. Y., Frank C. Owens.

New Castle Lime and Stone Co., New Castle, Penn., Ellwood Gilbert.

George Sherrard Paper Co., Buffalo, N. Y., Joseph Velzer.

Buffalo Broadcasting Corp., Buffalo, N. Y., R. J. Graff.

Marble Cliff Quarries Co., Columbus, Ohio, W. H. Margraf.

Just before the close of the meeting, R. J. Graff, sales division of the Buffalo Broadcasting Corp., Buffalo, was presented and gave a very interesting talk about the advantage of advertising through the medium of radio broadcasting. Mr. Graff so explained the possibilities of radio advertising that all members were thoroughly impressed.

Immediately following the meeting, luncheon was served and after the luncheon the delegates motored to Erie Down Country Club as the guests of the Michigan Limestone and Chemical Co. and the George Sherrard Paper Co. A number of the members enjoyed a round of golf during the afternoon and the crowd then returned to Buffalo to attend the annual banquet.

All present had a delightful time and left Buffalo looking forward to the annual meeting in June of 1931. N. C. Farber is president of the organization and W. H. Margraf, secretary and treasurer, with headquarters in the Hartman Building, Columbus, Ohio.

Michigan State Cement Plant Reported to Be for Sale

THE CHELSEA CEMENT PLANT is for sale.

With a deficit of $800,000 now on the books against this state-owned industry and a report that a loss of 13c is being sustained on every barrel of cement manufactured, Governor Fred W. Green admitted recently that he will welcome discussing the matter with possible purchasers.

"I am not sure that the administrative board has authority to sell the plant," Governor Green said. "It is my contention that the board under the previous administration had no power to buy it. Consequently, as I see it, we have no right to sell it. It is probable a legislative act would be required However, the board will be glad to discuss the matter with prospective customers."

The proposal came up recently when the finance committee of the administrative board submitted a recommendation that the Chelsea plant be sold "in view of present business conditions." The report apparently was a surprise to the chief executive and he referred it to the committee on institutions.

The plant was bought under the administration of former Governor Alex J. Groesbeck. It cost $500,000 and another $200,000 has been spent. The cost was to have been met by the plant's profits, but there has been nothing but annual deficits since.—*Detroit* Mich.) *Free Press.*

Cement Products Plant for Martinsville, Va.

MARTINSVILLE'S, Va., and Henry county's largest industry is a concrete tile plant, under course of construction near town, on the Fieldale road, by the Lester Lumber Co. A large sum of money is being expended for a modern and up-to-date plant, where tile and other concrete products will be manufactured. Glazed, colored and natural colored tile blocks will be made in this plant, producing at the rate of several thousand pieces daily, according to the demand.

There is no other plant of this kind in the state, and the selling territory will include several states, it was said. A small quantity of the products have already been produced, whereas the full operation will be started, upon the completion of all necessary machinery, within sixty or ninety days.—*Winston-Salem* (N. C.) *Sentinel.*

United Rock Asphalt Co. Trustee Resigns

THE Pennsylvania Co. for Insurances on Lives & Granting Annuities, Philadelphia, Penn., has resigned as trustee of the United Rock Asphalt Co., under the indenture by the company dated January 16, 1928, and also of the second mortgage dated January 16, 1928.

News of All the Industry

Incorporations

Allied Cement Industries, Inc., Wilmington, Del.

North American-Peru Corp., Wilmington, Del., $600,000. To produce mineral products.

Somerset Crushing Co., Bernardsville, N. J., $250,000. Harry W. Hoffman, Michael J. Nervine and Jacob Deutsch, Bernardsville.

Wallis Stone Co., Inc., Bedford, Ind., 500 shares, par value $100 each. A. R. Wallis, S. R. Wallis and C. R. Johnston.

Yancey Cyanite Co., Burnsville, N. C. J. A. Pollard, Burnsville, and G. H. Wright, Asheville, N. C.

Mountain Cross Granite Corp., Salida, Colo., $100,000. W. H. Wade, A. Weinberger and F. Arnold.

The Lake Ports Supply Co., South Milwaukee, Wis., 20,000 shares. To deal in concrete materials, etc. D. P. Ells, South Milwaukee.

The Lea County Sand, Gravel and Clay Co., Hobbs, New Mex., $50,000. W. B. Childers of Hobbs; R. P. Fullerton, Santa Fe, and Mrs. Josefita Lucero, Las Vegas, New Mex.

Louisville Cement Corp., Speed, Ind., 15,000 shares, no par value. To manufacture cement and other mineral products. Floyd H. Compton, Jonas G. Howard and John M. Buchheit.

Lincoln Sand and Gravel Co., Inc., Worcester, Mass., 100 shares common, no par value. To deal in marble, stone, gravel and sand. President, John P. Williams; treasurer, Thomas F. Williams, 141 Dorchester St., Worcester, and Edward A. O'Brien.

Quarries

R. L. Barnes, Brunswick, Ga., has leased the plant of the Southern Cement and Stone Co.

Southern Illinois Limestone Co., Harrisburg, Ill.: W. A. Grant, former president, announces that he has sold his stock in the company and severed all business connections with it. He assisted in the organization of the company and was president, and acted as sales manager and rate attorney for it.

Limestone Products, Ltd., has head office at 305 Excelsior Life Building, Toronto, Ont., and plant at Uhthoff, Ont. The company purchased in 1929 the quarry of the Ontario Stone Corp., which had been established in 1912. A new plant was constructed for the production of crushed stone for commercial purposes, fluxing stone, limestone dust and agricultural lime. The daily capacity of this plant is 1200 tons. Officers and directors of the company are: R. K. Russell, president; C. McQuigge, vice-president; F. S. Wells, secretary; G. F. More, general manager; W. C. Chambers and W. C. McCaffrey.

Sand and Gravel

Wilfert Sand and Gravel Co., Eugene, Ore., lost four recently built bunkers by fire on July 6.

Lutesville Sand and Gravel Co., Walnut Ridge, Ark., reported operating its plant at Black Rock on day and night shifts to fill orders for highway construction.

Michigan—Evans S. Schmeling, of the University of Michigan, Ann Arbor, and Hugh Estry, of Michigan State College, East Lansing, are residing in Gladstone temporarily while engaged in a gravel survey for the Michigan state highway department. During the past ten days they have been engaged in investigating suitable gravel deposits along US-41 for resurfacing the highway between Rapid River and Trenary.

Western Sand and Gravel Co., Spring Valley, Ill., had 700 ft. of heavy insulated copper cable, valued at approximately $750, stolen from a reel loaded on a truck. The company's electric shovel was being moved from the top of the bank, where it had been used for stripping, back into the pit. It was left overnight with the reel of cable on an accompanying truck alongside the public highway. A reward of $25 was offered for information leading to detection of the thieves.

Cass City, Mich.: The Elkland township board has voted to purchase the 4½-acre tract of land with its house and barn, a half mile south of Cass City, from Jacob Spencer for $2000. The purchase will be financed by a loan which will be paid in the taxes of 1932. This tract contains a gravel pit which Highway Commissioner John Profit thinks will provide sufficient gravel for township purposes for 12 to 15 years, estimated on the present-day use of that product. The township has been paying approximately $500 annually for gravel in late years.

Belmont Supply Co., Martins Ferry, Ohio, is now loading sand and gravel dredged from the Ohio river bottom on rail cars destined for distant shipment. Supplies are also loaded from river boats and placed in the company's bins for local consumption. Equipment costing around $25,000 was installed last spring by this new industry. A revolving hoist lifts a bucket with 1¾ tons of sand or gravel from a barge and dumps it into a steel hopper bottom car on the rail siding. A steel hopper car can be loaded in just one-half hour. A fleet of trucks haul from the company bins for local jobs. The sand and gravel products of the company are being used on the city park construction. The majority of the local contractors and builders supply firms are also patronizing the new industry. Robert Meister of the Meister Fuel Co. is general manager of the company.

Cement

Wellston Iron Furnace Co., Superior, Ohio, is reported to have ceased production during July, its silos being well stocked to take care of all demands.

Northwestern States Portland Cement Co., Mason City, Iowa, is taking the necessary legal steps to become an Iowa corporation. It is now incorporated in West Virginia.

Colorado Portland Cement Co., Fort Collins, Colo., is reported to have closed its mill from July 1 to July 15 to give a vacation to employes and to make necessary repairs and replacements of equipment.

West Penn Cement Co., West Winfield, Penn.: Excavation is now going on for the new clinker bin to be installed next month. This new bin will give an increased storage of about 1900 bbl. and also make a much more flexible arrangement to handle the increased output of the two kilns.

Idaho Portland Cement Co. has been awarded a contract by the United States Reclamation Service for 60,000 bbl. of cement to be delivered at the Deadwood dam, north of Boise, Idaho. According to President Enloe of the company, this means the operation of the big cement mill until the snow flies.

Agricultural Limestone

W. F. Thirkildson, Lake Phelps and New Bern, N. C., and **C. B. Spencer**, Statesville, N. C., reported interested in organizing company for development of marl beds on Trent river near New Bern and peat beds around Lake Phelps.

Mid-West Limestone Co. has offered a free car of limestone to the Clay County Farm Bureau, Flora, Ill. This car will be presented to the man or men that sign up the largest number of memberships in the Clay County Farm Bureau before September 1.

Silica Sand

Silica Co. of California, near Byron, Calif., is developing a silica sand deposit at Mt. Diablo. R. M. Greathouse is president and general manager.

Cement Products

H. C. Matthias and Son's concrete block plant was damaged by fire July 2 to the extent of $12,000.

Independent Concrete Pipe Co., 201 North West St., Indianapolis, Ind., with plant on North Sherman Drive, has arranged for increase in capital to $525,000, part of proceeds to be used for expansion.

Miscellaneous Rock Products

Chicago Mica Co., and Fibroc Insulation Co., Valparaiso, Ind., and **Continental-Diamond Fibre Co.**, Newark, Del., have been merged, according to L. T. Frederick, president of Fibroc Insulation Co. and vice-president and general manager of Chicago company. It is planned to continue Valparaiso units as separate holdings. Victor R. Despard, who has been associated with Mr. Frederick in ownership and management of Chicago Mica and Fibroc Insulation companies, has retired.

Southern Mineral Products Corp., a subsidiary of Vanadium Corp. of America, Inc., Oliver Bldg., Pittsburgh, Penn., has awarded contract to Stone and Webster, Inc., Boston, Mass., engineer and contractor, for design and construction of new plant near Afton, Amherst county, Va., about 50 miles from Lynchburg, where more than 2000 acres has been secured. Project will consist of several units for production of ilmenite and other minerals used in titanium and kindred manufacture, to cost over $1,000,000 with machinery. Development will include a power house and machine shop.

Personals

H. D. Carlton has resigned as president of Consolidated Ashcroft Hancock Co., Inc., and as vice-president of Manning, Maxwell and Moore, Inc.

Paul C. Hodges, vice-president, Marble Cliff Quarries Co., Columbus, Ohio, has been elected a director of the Columbus Chamber of Commerce.

R. J. Binford, who graduated in June from the University of Cincinnati, has been placed in charge of the mechanical department of the West Penn Cement Co., Butler, Penn. He is a son of O. J. Binford, general manager of the company.

S. T. Burton has resigned as a director, vice-president and general sales manager of the Century Cement Corp., Rosendale, N. Y. His present address is either Builders' Club, Chicago, or 1080 Park Ave., New York City.

W. W. Binford, formerly assistant superintendent and plant engineer, West Penn Cement Co., Butler, Penn., recently accepted a position with the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., as sales engineer. He is a son of O. J. Binford, general manager of the West Penn Cement Co.

Scott Turner, director of the United States Bureau of Mines, has been appointed by the board of directors of the American Institute of Mining and Metallurgical Engineering to represent the Institute at the annual meeting of the Institution of Mining Engineers to be held at Birmingham, England, July 9-12. He sailed on the S.S. "Bremen" on June 27.

Sylvester H. Smith, who has been connected with the J. K. Davison Co. of Pittsburgh, Penn., has taken a position with the Oil City Sand and Gravel Co. as assistant to his father, Capt. Charles F. Smith, general manager of the concern. He has already arrived in Oil City and has entered upon his new duties. Mr. Smith is an experienced river man and while employed with the Davison company he was captain of the steamer "E. K. Davison."

J. B. John, president and general manager of the Medusa Portland Cement Co., Cleveland, Ohio, and chairman of the committee on accident prevention of the Portland Cement Association, received many messages of congratulation from friends in the cement industry in all parts of the country upon the occasion of his birthday anniversary on July 11. Mr. John's splendid work in connection with accident prevention in the cement mills is well known and appreciated.

Obituaries

Edward Ruck, 42, of Milwaukee, Wis., father of five children, was drowned July 12 when he backed a loaded 5-ton gravel truck too far into an abandoned stone quarry near State St. and Hawley Rd. The body was recovered at 7:40 p. m., three hours after the accident. Mr. Ruck lost control of the truck and it slipped off a shelf into 25 ft. of water. A public works department derrick was unable to raise the truck until a second derrick was used. It was thought at first that Mr. Ruck was imprisoned in the cab of the truck. The derricks raised the machine sufficiently to determine that the driver had gotten out of the cab before drowning.

Two policemen in a rowboat dragged for the body while the work of raising the truck went on. The quarry, owned by William Manegold, was abandoned and had filled with water. Mr. Ruck had been engaged by Mr. Manegold to dump sand and gravel on one shore of the pond to provide a swimming place. Mr. Ruck is survived by his wife, Ella, and five children, Edward 17, Harvey 13, Herman 7, James 3, and Eleanor 11. He was associated with his brother, Albert, in the Ruck Brothers Sand and Gravel Co., which had been founded by their father and was one of the oldest sand and gravel concerns on the west side of Milwaukee.

Manufacturers

The Olympic Machinery Co., Seattle, Wash., has changed its name to Bert G. Danley Co.

The Chicago Pump Co., Chicago, Ill., has announced the addition of R. J. Welsh, 503 Healy Bldg., Atlanta, Ga., to its list of representatives.

Fuller Lehigh Co., Fullerton, Penn., has opened a new sales office in the Candler Bldg., Atlanta, Ga. J. McC. Hill is in charge of the new office.

General Refractories Co., Philadelphia, Penn., is establishing its southern headquarters at Birmingham, Ala. Offices have been leased in the Empire Bldg. and will be opened by July 1, according to Walter S. Stapler, general southern sales manager.

Wagner Electric Corp., St. Louis, Mo., announces the combination of the sales office and service station for the Atlanta territory and the installation of both in the new building at 14-20 Alexander St., N.W., Atlanta, Ga.

Caterpillar Tractor Co., San Leandro, Calif., has made an agreement with the Bates Manufacturing Co., a subsidiary of Foote Bros. Gear and Machine Co., whereby Caterpillar has granted the Bates company a license to manufacture track-type tractors under Caterpillar patents.

Republic Steel Corp., Youngstown, Ohio, has opened a new district sales office in Indianapolis, Ind. H. H. Pleasance, formerly general manager of sales of the steel bar department of the Bourne-Fuller Co., has been appointed sales manager for the Indianapolis district.

Parsons-Thompson Engineering Co., Cleveland, Ohio, announces that its name has been changed to the Parsons Engineering Corp., effective July 1. The directors and management remain as before. In addition to the Cleveland office, the company has a Chicago office at 1305 Marquette Bldg. and a Detroit office at 2700 Wight St.

The Prest-O-Lite Co., Inc., 30 East 42nd St., New York City, has placed in operation a new plant for the manufacture and distribution of dissolved acetylene at Casper, Wyo. The plant is located on a private siding of the Chicago, Burlington and Quincy railroad, and the address is 648 Bryan Stock Trail, Casper, Wyo.

Hercules Motors Corp., Canton, Ohio, has appointed the Automotive Products Co., 3, Berners St., London, W. 1, as sole distributor of Hercules engines and power units for Great Britain and continental Europe, exclusive of Russia. The Automotive Products Co. also maintains branch offices at Berlin (Zollernhof, 56 Unter den Linden) and at Vienna (1—Lobkowitzplatz, Vienna—1).

General Electric Co. sales billed for the first six months of 1930, announced by President Gerard Swope, amounted to $197,229,346.82, compared with $194,353,307.99 for the corresponding period last year. As a result of the transfer of radio receiving set and tube business, orders received, sales billed and net income from sales in 1930 do not include radio sets or tubes.

Hercules Powder Co., Wilmington, Del., is undertaking rearrangement of plant facilities at its Carthage, Mo., explosives plant, at a cost which is estimated at $175,000. Thirteen small buildings in the plant area are to be replaced by nine new buildings, modern in design and equipment. Much of the cost of the project will be incurred in removal and installation of material and machinery.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., reports bookings in the first six months of this year amounted to $29,500,000, a gain of $1,478,000 over the first half of last year. Unfilled orders on June 30 last established a new high mark at $17,926,000, an increase of $5,054,000, or 40%, over the $12,872,000 as of December 31, 1929. Orders booked in June totaled $4,606,000 and sales billed were $4,070,000.

American Steel and Wire Co., Chicago, Ill., subsidiary of the United States Steel Corp., has produced a very successful "Talkie" industrial motion picture, featuring a trip through the mills in which wire rope is made. The entire process is not only visible on the silver screen, but the illusion of actually being present is increased by the introduction of sound. As each stage of manufacture is viewed it is orally explained in detail.

Westinghouse Electric and Manufacturing Co.'s board of directors has created three new executive positions, the offices of commercial vice-presidents. C. E. Stephens was selected to occupy the new position for the Atlantic division, N. H. Symonds for the Central division, and W. R. Marshall for the Pacific division. Each of the new commercial vice-presidents is a district manager and will retain the duties of that position in addition to those of the new office.

Cutler-Hammer Manufacturing Co., Milwaukee, Wis., has acquired on an exchange of stock plan, the basis for which has not been announced, Schweitzer and Conrod, Inc., Chicago, manufacturers of high-voltage equipment. The acquired company will continue to manufacture and sell under its own name, and there will be no change in the organization or personnel, except that B. K. Worden, president of Cutler-Hammer, will also become president of Schweitzer and Conrod.

North American Refractories Co., Cleveland, Ohio, has purchased the assets, good will and business of the United States Refractories Corp., Mt. Union, Penn., and the Savage Mountain Fire Brick Co. of Allegany County, Frostburg, Md. The company now owns 15 plants located in Pennsylvania, Kentucky, Ohio and Missouri, with a combined annual capacity of approximately 155,000,000 fire brick, and the purchase of the two companies mentioned increases this capacity to approximately 200,000,000 fire brick. The entire organization of the two acquired companies, headed by President Thomas N. Kurtz, becomes part of the North American company, and temporarily the management and sales of those companies will be handled as heretofore from Mt. Union, Penn., as a division of the North American Refractories Co.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Compartment Mills. New circular outlining the advantages of Traylor compartment mills for the production of high early strength portland cement. TRAYLOR ENGINEERING AND MANUFACTURING CO., Allentown, Penn.

Sanitary Requisites. General catalog on U. S. sanitary specialties for all public buildings, including liquid soap dispensing equipment, air conditioners, deodorizers, polishes, varnishes, waxes and other sanitary requisites. U. S. SANITARY SPECIALTIES CORP., Chicago, Ill.

Excavators. Bulletin **No. 890-B**, giving a general description of P&H models 800 and 900 excavators of unit cast steel construction, which can be used as shovels, draglines or cranes. Dimension tables, complete specifications, etc. HARNISCHFEGER CORP., Milwaukee, Wis.

Dump Truck Equipment. The June issue of "Heil Quality News" contains a number of interesting illustrations on dump truck equipment in use at rock products plants, with explanations of each of the pictures. THE HEIL CO., Milwaukee, Wis.

Concrete Products Machinery. "What should a concrete block look like?" is answered in an article on the appearance of concrete block in the June, 1930, issue of "Besser Tampings." The issue also carries an article on the cost of production in an up-to-date concrete products plant. BESSER MANUFACTURING CO., Alpena, Mich.

Excavators. New catalog covering the Ruston-Bucyrus new No. 1030 ¾-cu. yd. excavator, the cover of which shows a typical installation picturing the machine in use at a sand and gravel plant for stripping operations, as a dragline for digging sand and gravel from below water level, and as a clamshell for loading from sand and gravel stock piles. RUSTON-BUCYRUS, LTD., Lincoln, England.

Centrifugal Pumps. Bulletin **No. 215** on double suction single stage centrifugal pumps, built in sizes to handle capacities up to 20,000 gal. per minute and for heads up to 300 ft. Completely illustrated with photographs, diagram and charts, including one showing positive head required for pumping hot water and per cent. of normal cold water capacity a pump is capable of delivering. PENNSYLVANIA PUMP AND COMPRESSOR CO., Easton, Penn.

Construction Equipment. A complete line of construction equipment, including pavers, pumps, shovels, cranes, draglines, backfillers, large tilting mixers, non-tilting mixers, steel tower and concrete placing equipment, hoists, concrete mixers, plaster and mortar mixers, hopper and rocker dump cars, stone skips, buckets, material elevators, etc., are described in the new pictorial catalog just issued by the NATIONAL EQUIPMENT CORP., Milwaukee, Wis.

Shovels. New folder on the Marion 3-yd., type No. 5120 electric quarry shovel of close coupled design for volume production, 4-yd. type 4160 electric shovel for use where heavy duty and top production are required, 2¼-yd. type 490 electric shovel of medium size, built for quarries where extreme ruggedness and relatively high speeds with high bail pull are needed, 1½-yd. type 460 electric or steam shovel designed for quarries of limited output, and 2-yd. type 480, a medium size machine built especially for quarries where extra high speeds are required. THE MARION STEAM SHOVEL CO., Marion, Ohio.

Buffton (Ohio) Stone Company Begins Operation

THE BLUFFTON STONE CO., Bluffton, Ohio, has begun operations at its recently completed plant, as announced by manager Raymond Conrad.

First stone produced is being used to pave the 900 ft. road recently constructed from the plant to Water street. The plant will employ eight men and has sufficient business in sight to run for balance of the season.

Illinois Tenant Farmers Buy Agricultural Limestone

ONE PROBLEM that has always vitally interested agricultural lime and limestone producers is the case of the tenant farmer. Soil liming, being a long-time improvement, is hard to sell the farmer who merely rents his farm. Hence the following article, broadcast to scores of Illinois country newspapers by the state agricultural department at Urbana, Ill., and used generously, is of more than ordinary interest to the producer. A typical article reads:

"Tired of clover failures year after year, George Plackett, a Ford county tenant farmer bought two tons of limestone himself and thereby succeeded in convincing his landlord that sweetening the acid soil on the farm would pay both of them. Plackett is one of the many co-operators in the limestone-legume project which the extension service of the College of Agriculture, University of Illinois, is pushing throughout the state. The demonstration which he staged was so convincing that the landlord this year ordered two carloads of limestone for the farm, according to a report by C. M. Linsley, soils extension specialist of the college.

"In planning his demonstration to convince the landlord that the soil was acid and needed limestone, Plackett spread his two tons of lime on a single acre in a 40-acre field that was to go to oats with a seeding of red clover. Although there was a good stand of clover on the whole field, the heavier growth on the limed plot was noticeable as soon as the oats was cut. Clover on the limed acre was cut separately and made three loads to the acre. The rest of the field averaged two tons to the acre. The difference was so striking that the landlord ordered the two carloads of limestone without asking for further proof.

"Although acid land may produce a fair stand of clover, the crop often is short because there is not enough limestone to produce a vigorous growth," Mr. Linsley explained. "Limestone pays on acid land because it not only increases the chances of a stand but also increases the yield by a ton or more to the acre," he added.